CODE NO.FTD82090235

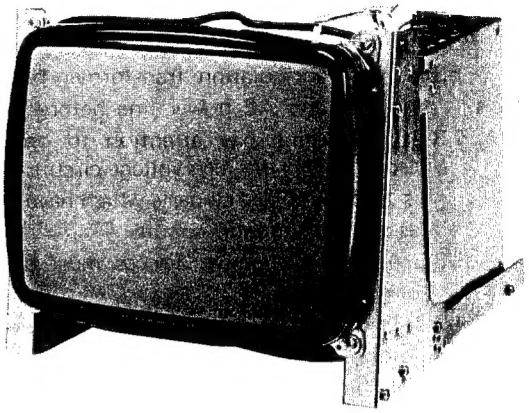
Service Manual

Color CRT Data Display

Original

MODEL TX-1201FH

Chassis No. X04



CONTENTS

Panasonic®
Matsushita Electric

1. SAFETY PRECAUTIONS

1-1 CAUTION:

No modification of any circuit should be attempted. Service work should only be performed after you are thoroughly familiar with all of the following safety checks and servicing guide lines.

1-2 SAFETY CHECK

Care should be taken while servicing this CRT display because of the high voltage used in the deflection circuits. These voltages are exposed in such areas as the associated flyback and yoke circuits.

1-3 FIRE & SHOCK HAZARD

1-3-1 Insert an isolation transformer between the CRT display and AC power line before servicing chassis.

1-3-2 In servicing pay attention to original lead dress especially in the high voltage circuit. If a short circuit is found, replace all parts which have been overheated as a result the short circuit.

1-3-3 All the protective devices must be reinstalled per original design.

1-3-4 Soldering must be inspected possible for cold solder joints, frayed leads, damaged insulation, solder splashes or sharp solder points. Be certain to remove all foreign material.

1-4 IMPLOSION PROTECTION

All Panasonic picture tubes are equipped with an integral implosion protection system, but care should be taken to avoid damage and scratching during installation. Use only Panasonic replacement picture tubes.

1-5 X-RADIATION

WARNING: The only potential source of X-Radiation is the picture tube. However when the high voltage circuitry is operating properly there is no possibility of X-Radiation problem. The basic precaution which must be exercised is to keep the high voltage at the following factory-recommended level.

Note: It is important to use an accurate periodically calibrated high voltage meter.

1-5-1 To mearsure the high voltage, use a high impedance high voltage meter, Connect(−) to chassis and (+) to the CRT anode button.

1-5-2 Turn the Brightness control fully counterclockwise.

1-5-3 Measure the high Voltage. The high voltage meter should indicate at the following factory-recommended level.

1-5-4 If the upper meter indication exceeds the maximum level, immediate service is required to prevent the possibility of premature component failure.

1-5-5 To prevent X-Radiation possibility, it is essential to use the specified picture tube.

1-5-6 The nominal high voltage is 24.5KV and must not exceed 25KV at zero beam current at rated voltage.

IMPORTANT SAFETY NOTICE

There are special components used in Panasonic CRT displays which are important for safety. These parts are shaded on the schematic diagram and on the replacement parts list. It is essential that these critical parts should be replaced with manufacture's specified parts to prevent X-RADIATION, shock, fire or other hazards. Do not modify the original design without written permission of the Panasonic company or this will void the original parts and labor guarantee.

GENERAL INFORMATION

Here is an outline of Model TX-1201FH.
This model is COLOR CRT DATA DISPLAY of metal frame type.

TX-1201FH uses High Resolution (Dot pitch 0.31mm) color Cathode Ray Tube.

Input signal is separate type and each input signal is put through 20 pin Connector on the P.C. Board.

Input signal is for TTL level,and H. drive pulse is capable of correspouding to 23.81μS.

In order to meet users' requirements, frame mechanism is employed for easy adjustment of CRT setting angle.
Angle can be changed by stages such as 0°, 2.5°, 7.5° and 10°
Switching requrator Circuit is Applied to for power supply of this model. and it is available for AC input 90~140V / 180~264V by changeing the select switch (115V / 220V) which builted-in the Switching Regurator.

COLOR DISPLAY SPECIFICATIONS

1. MECHANICAL DESCRIPTION

Dimension:

Height:	10.39" (264mm)max.
Width:	12.40" (315mm)max.
Depth:	14.63" (371.6mm)max.
Weight:	25.4 lbs (11.5kg)
Picture Tube:	320DAB22TC01
	Size 12"
	Gun In—Line
	Def, Angle 76°
	Neck dia 1.146" (29.1mm)
	Phosphor R. G. B
Tilt:	10°

2. ENVIRONMENT

Ambient temp, Humidity and Altitude:

Operating:

Temp:	32°F~122°F (0°~50°C)
Humidity:	5~90%
Altitude:	10,000 FT max. (3,000m)

Non-operating:

Temp:	−40°F~149°F (−40~65°C)
Humidity:	5~90%
Altitude:	40,000 FT max. (12,000m)

Storage and Shipment:

Temp:	−40°F~149°F (−40~65°C)
Humidity:	5~90%
Altitude:	40,000 FT max. (12,000m)

Vibration and Shock: (Packaged condition)

Vibration:
meet the following:

Frequency:	5~55 Hz
Vertical:	1.25 G
Horizontal:	0.75 G

Shock:

Coner and edge:	Height 19.69" (50cm)
Front, Back, Side, Bottom:	Height 23.62" (60cm)

3. ELECTRIC PERFORMANCE

Power supply:

Input Voltage:	AC90~140 / 180~264V
Input Frequency:	50 / 60Hz
Input Current:	0.8A max.
Power:	55W max.
Inrush Current:	45 A op max. (at 100V AC)

Input Signals:

Horizontal Sync:

Polarity:	Negative
Signal Level:	4Vpp ± 1V
Iuput Imp.	≧ 1.5K

Vertical Sync:

Porarity:	Negative
Signal Level:	4Vpp ± 1V
Input Imp.	≧ 1.5V

Video Sighal (R.G.B)

Polarity:	Positive
Signal Level:	4Vpp (See Note 1)
Tr. Tf:	≦ 5NS

Note 1. Max rise and fall times (from 10% to 90%) of input signals are less than 5 NS.

Image test Condition:

Charactor:	"H"
Color:	Green
Brightness:	Max.(without Back Raster)
View Direction:	Parallel to the CRT axis
Ambient Temperature:	Room Temp
Supply Voltage:	AC 115V

Note 2. To measure more then 20 minutes after power on.

Note 3. Normal Condition is the Condition that Satisfies Image test Condition. (Condition of following each items is normal condition, it not mentioned).

Video Out:

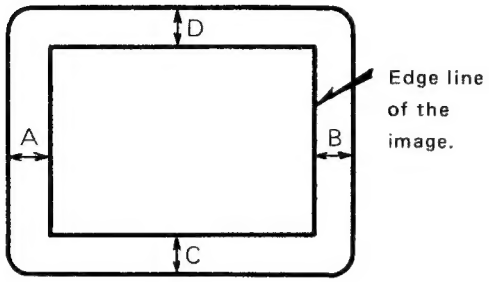
Turn Rise Time (Tr): Less then 20nS
Turn Fall Time (Tf): Less then 30nS
(To measure by 10MHz square-wave Duty 50%).

Image:

Charactet Area:	
Horizontal:	8.27 ±0.2" (210 ±5mm)
Vertical:	5.75 ±0.2" (146 ±5mm)

IMAGE POSITION:

To be able to adjust at the center of the CRT. Image is within the area in Fig.

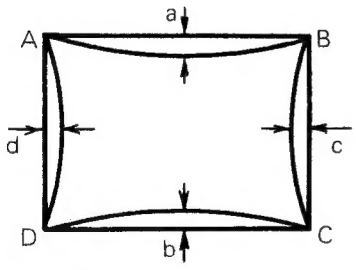


A–B ≦0.197" (5mm)
C–D ≦0.197" (5mm)
Normal Condition

DISTORTION:

(A) PINCUSHION

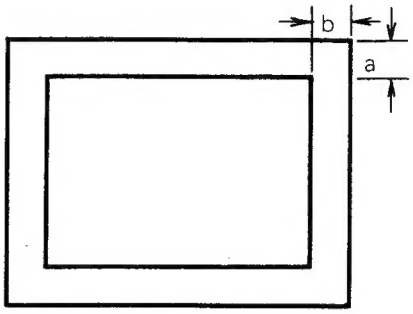
Upper: (a): Less than 0.087" (2.2mm)
Lower: (b): Less than 0.098" (2.5mm)
Right and Left (c), (d):
Less than 0.079" (2.0mm)



Input signal.....Cross-hatch

(B) RECTANGULARENESS & PARALLELOGRAM DISTORTION

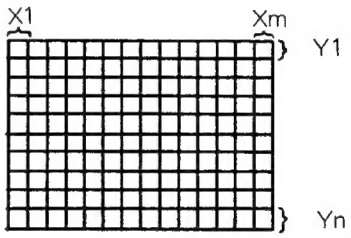
Edge of the image is within the area indicated by the dotted line in Fig.



a.....0.138" (3.5mm)
b.....0.138" (3.5mm)
Input signal.....Cross-hatch

(C) LINEARITY

Horizontal and vertical linearity shall be less than 7% see Fig.



Horizontal linearity

$$\frac{X\ max - X\ min}{X\ max + X\ min} \times 100(\%) \leqq 7\%$$

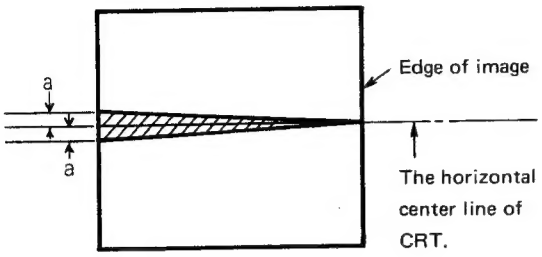
Vertical linearity

$$\frac{Y\ max - Y\ min}{Y\ max + Y\ min} \times 100(\%) \leqq 7\%$$

Note: Maximum and minimum value should not be adjacent to each other.
X max is maximum value among X1~Xm.
X min is minimum value among X1~Xm.
Y max is maximum value among Y1~Yn.
Y min is minimum value among Y1~Yn.
Input signal.....Cross hat, Green.

(D) ROTATION

Horizontal center line of the image shall be within the shaded area in Fig.

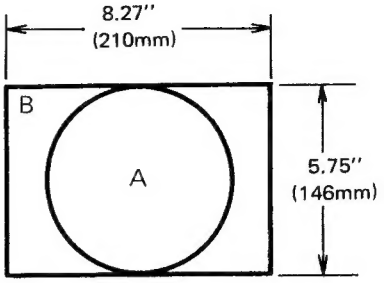


a.....0.087" (2.2mm)
Input signal.....Cross-hatch, Green.

Note: Should be measured under the following terrestrial magnetic field.
1). Without horizontal magnetic field.
2). With vertical magnetic field.

OVERALL PERFORMANCE:

MIS-CONVERGENCE



Center of the display area
(A) ≦ 0.0197" (0.5mm)
Peripheral display area
(B) ≦ 0.0276" (0.7mm)

Note: Should be measured under the following conditions.
*With out horizontal magnetic field.(terrestrial).
*with vertical magnetic field.
*At room temperature.
*Input signal : Cross-hatch, R.G.B. mixed color.

IMAGE SIZE VARIATION:

	Image size variation from the normal image size.	Range of Variation
By Brightness	Within 0.118" (3mm) (Horizontal and Vertical)	Max. to Min.
By Power Supply Voltage	Withen ±0.157"(±4mm) (Horizontal and Vertical)	AC 90~140V AC 180~264V
By temperature	Within ±0.157"(4mm) (Horizontal and Vertical)	25 ±25° C

Normal condition, if not mensioned.

HORIZONTAL RESOLUTION:

Horizontal 720pixels
Vertical 580pixels

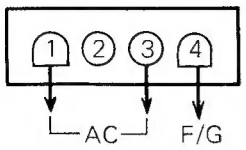
RESISTER BETWEEN FG AND SG:
15Kohms ±10%

INSULATION:
More than 100Mohms
(Between AC line and Chassis)

JITTER: Less than I dot.
(Invisible at a distance of 17.7" (45cm) from CRT surface.)

CONNECTOR AND WIRING

POWER SUPPLY:

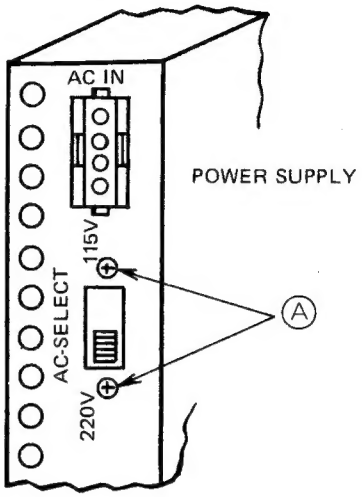


① ③ Power input
AC90~140/180~264V
50Hz/60Hz

④ Frame ground

When factory shipping, the power select Switch of the monitor power supply is set at 220V Side (AC input 180~264V).

There fore when use this unit in the 90~140V area, loose the 2(two) screws Ⓐ as shown fignre before 'power on then change the switch at 115V Side.

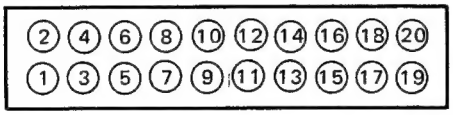


CONNECTOR TYPE:

MFR.....AMP Lock Connector

Display Side	Customer Side
4-Cap-housing (350780-1) Pin Contact (350561-1)	Connector (350779-1) Contact (350570-1)

SIGNAL INPUT:



Pin No.	Name	Pin No.	Name
1	Vertical Sync(V.S)	2	V.RTN (SG)
3		4	
5	Horizontal Sync(H.S)	6	H.RTN (SG)
7	Sound (Option)	8	SG
9		10	SG
11		12	SG
13		14	SG
15	Video (R)	16	R.RTN (SG)
17	Video (G)	18	G.RTN (SG)
19	Video (B)	20	B.RTN (SG)

CONNECTOR TYPE:

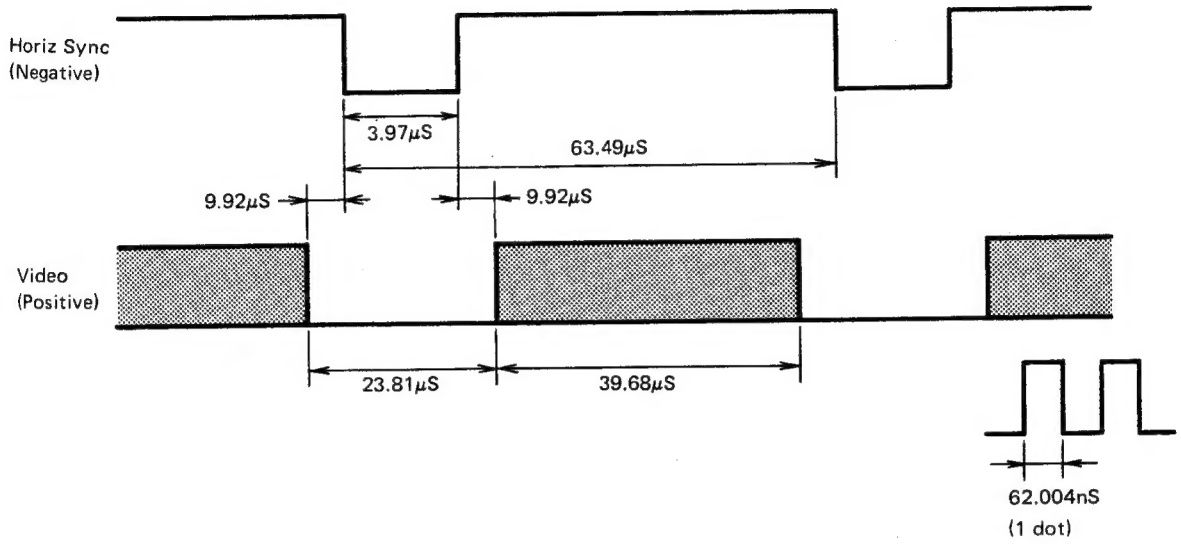
Display Side
MFR...Hirose Electric Co.,Ltd.
20P Connector
(HIF3-20P-254DS)

Custmer Side
MFR...Hirose Electric Co.,Ltd.
20P Connector
(HIF3N-20P-254R)

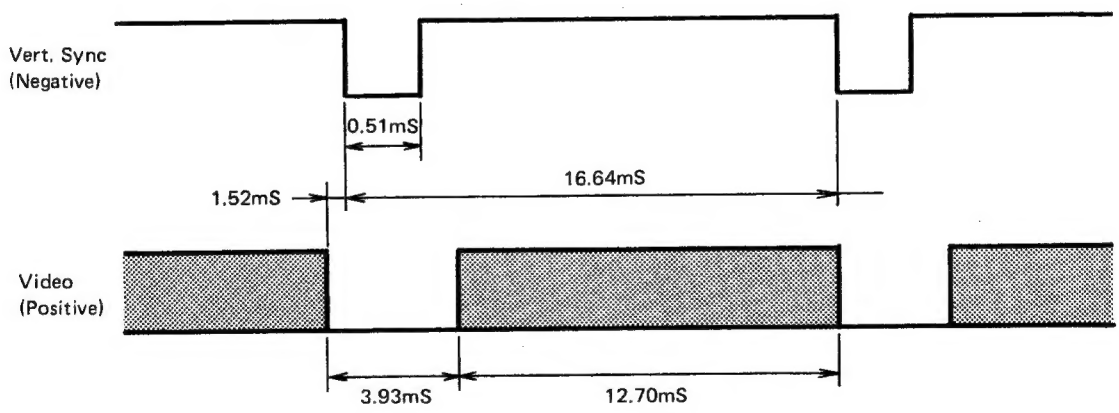
Note: The connectors of customer side are for your reference.

TIMING CHART

HORIZONTAL SYNC:



VERTICAL SYNC:



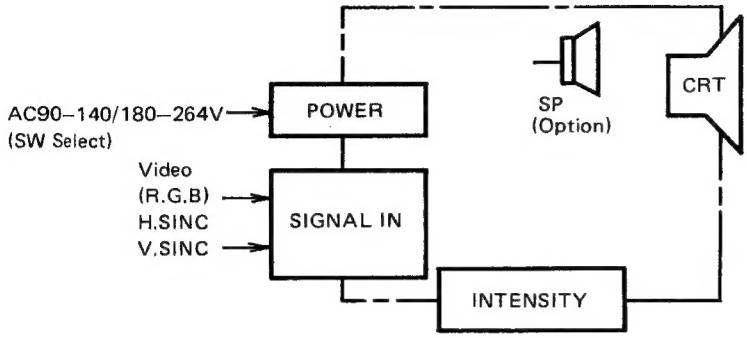
Note: Signal input level: TTL level
Time Tolerance: ±0.1%
Unit is adjusted according to this timing and frequency.

CONSTRUCTION AND BLOCK DIAGRAM

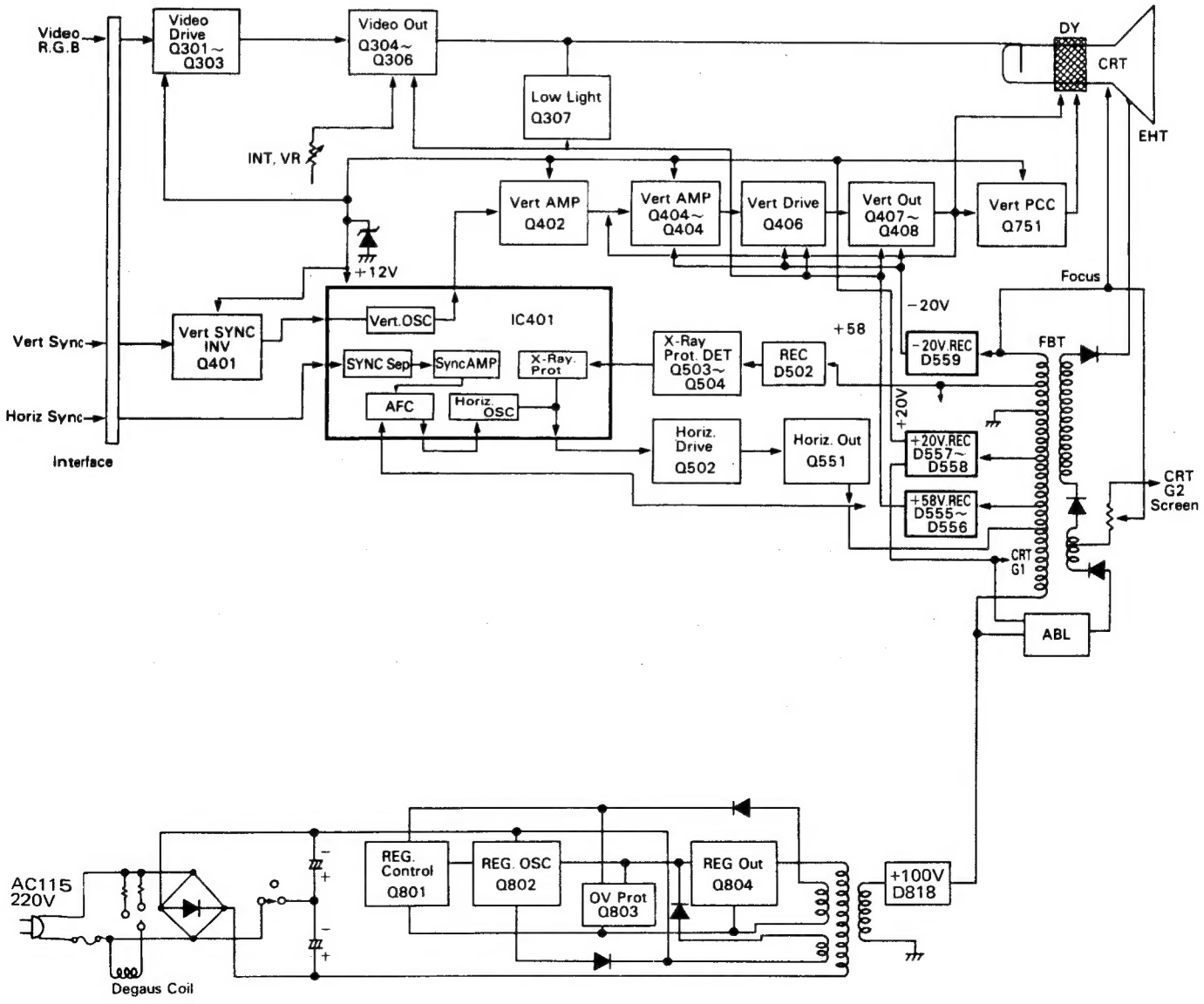
CONSTRUCTION OUTLINE

Note 1: CRT's Conducting Film is Connected to SG. (Signal Ground)

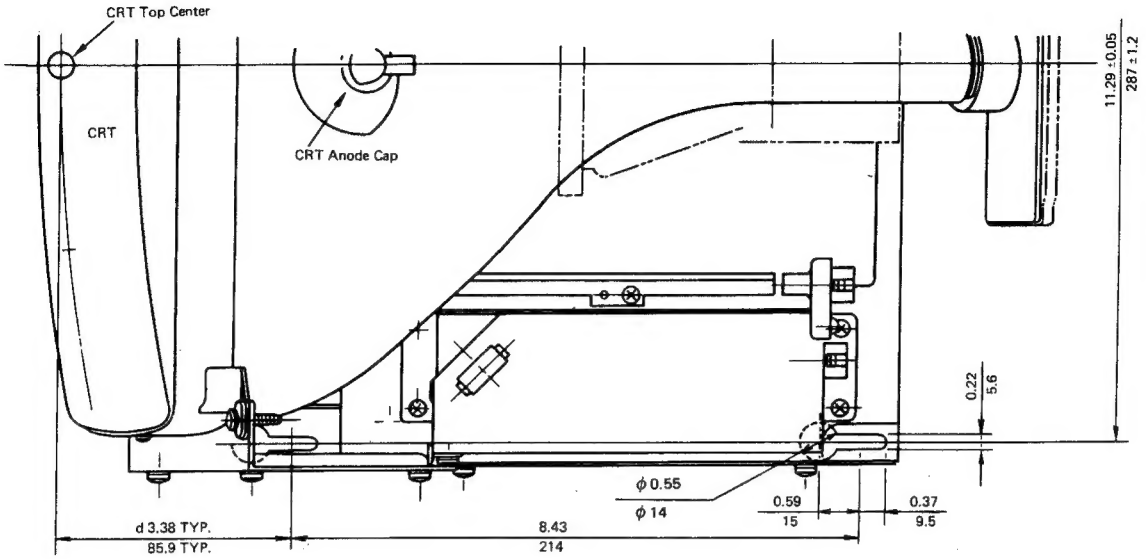
Note 2: SG and FG (Frame Ground) are separated by 15Kohm resister.



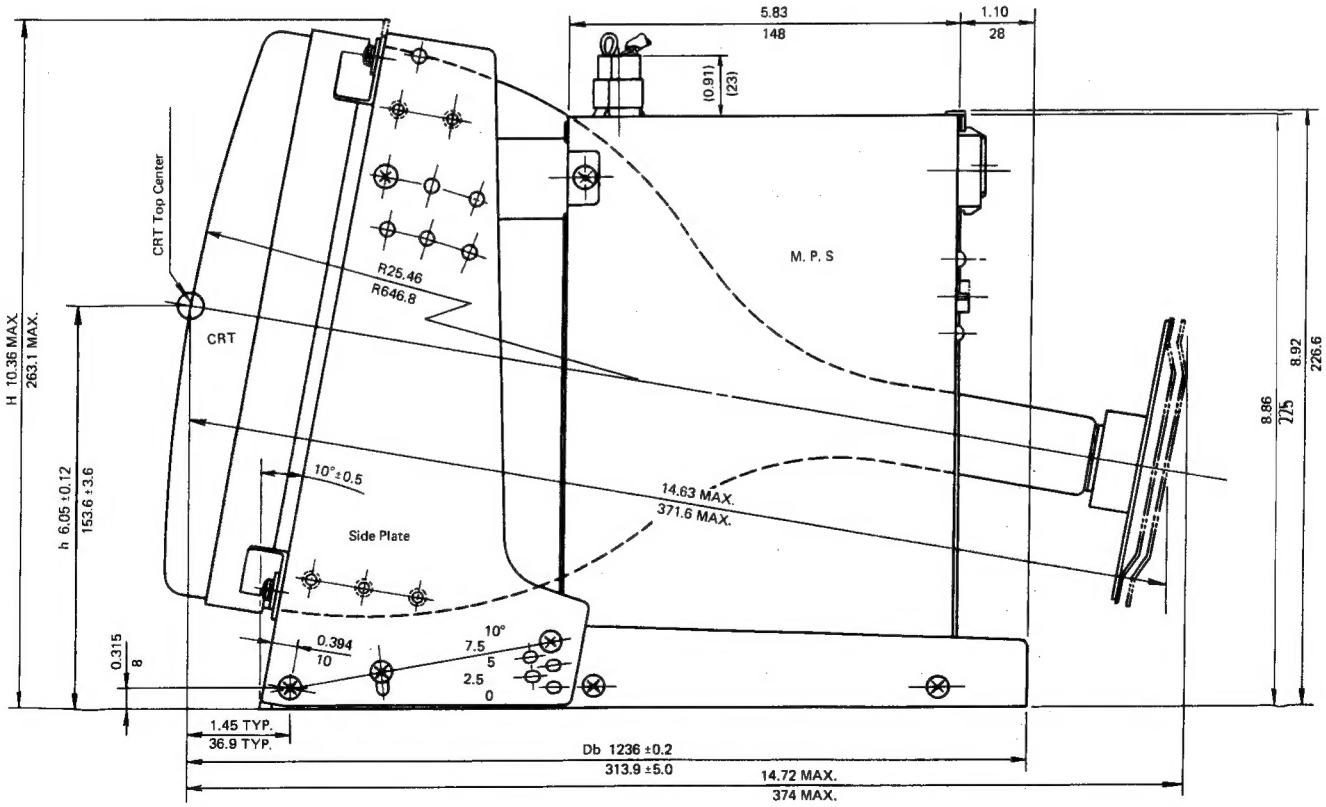
BLOCK DIAGRAM



DIMENSION

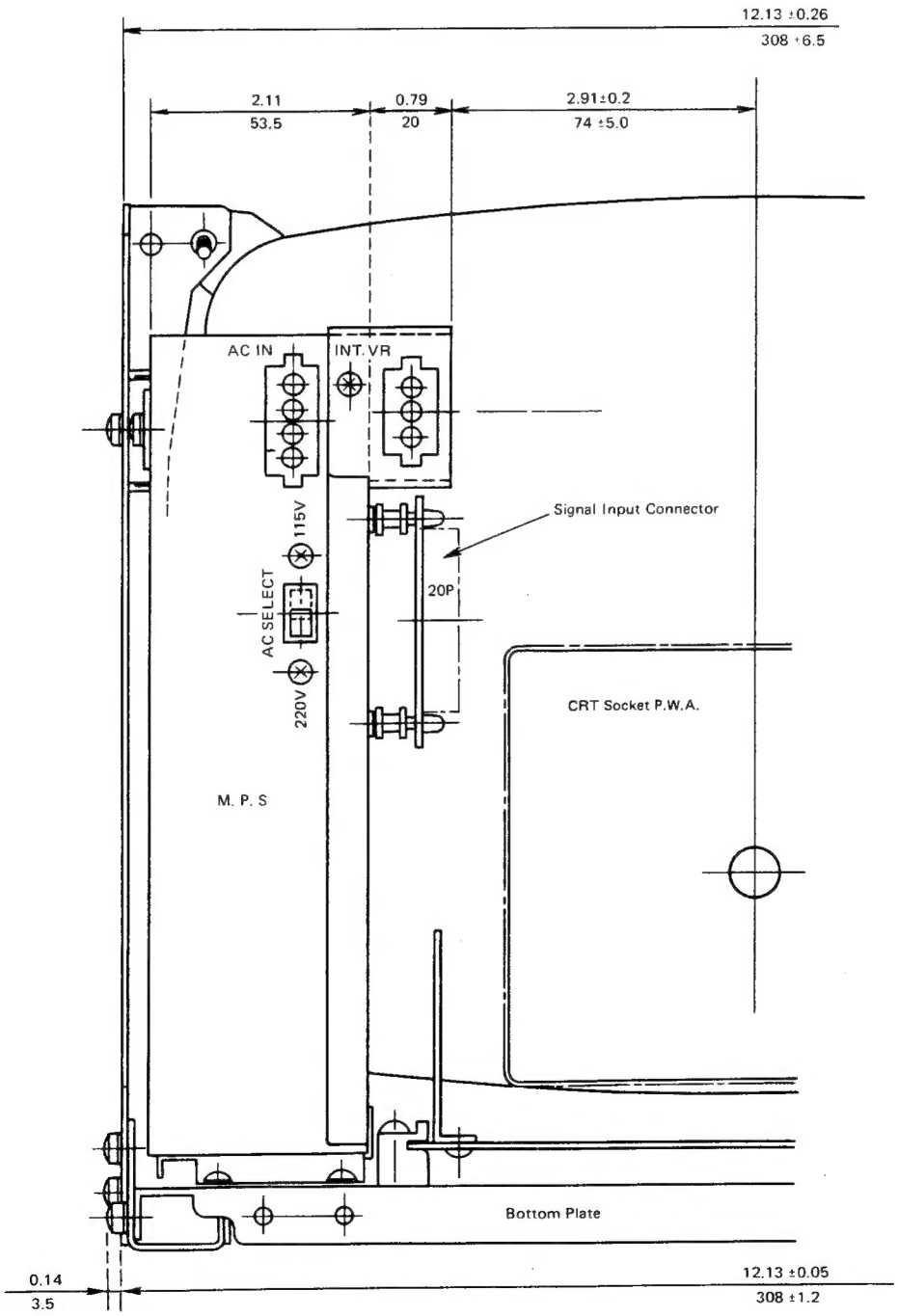


Dimension:
Upper Side: inch
Bottom Side: mm

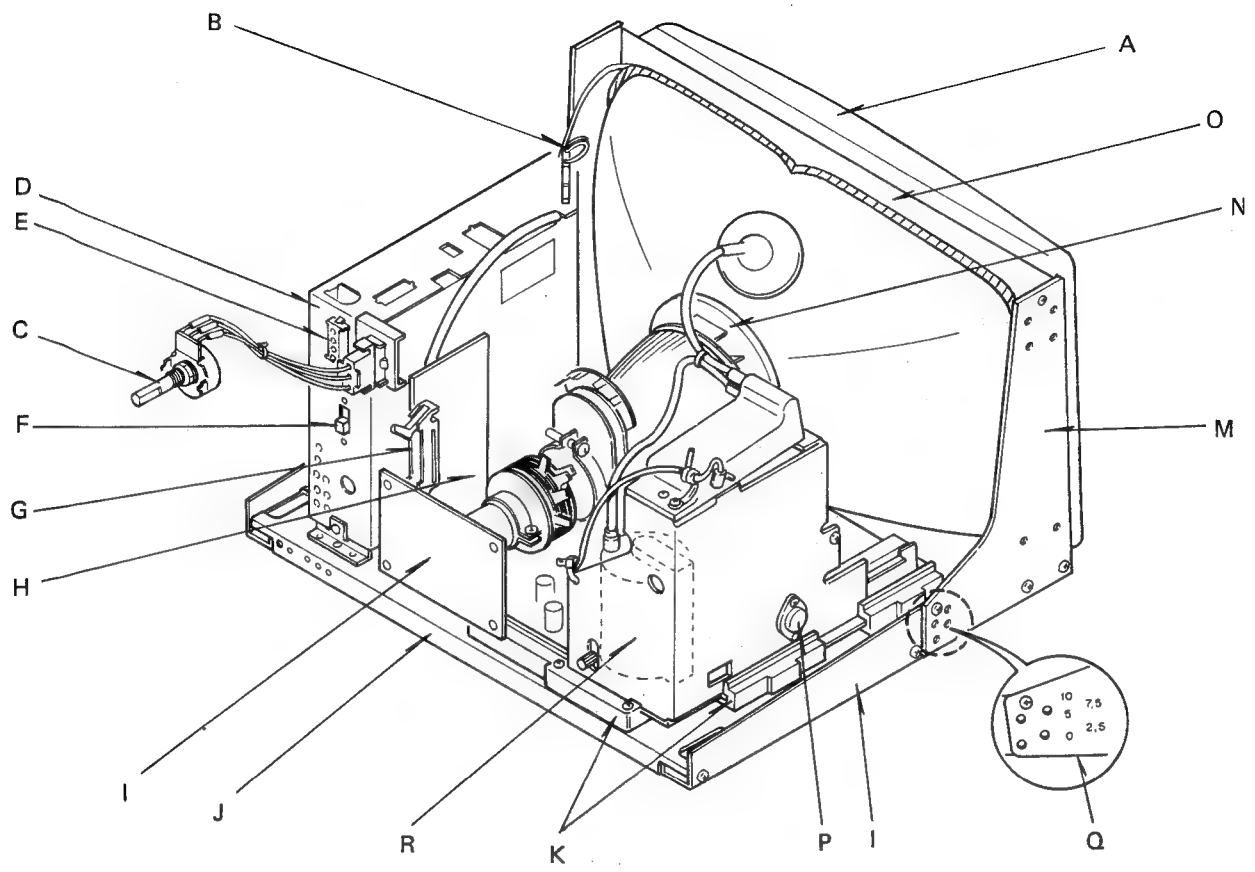


CRT TILT	H MAX. (inch)	(mm)	±0.12 h ±30		d TYP.		±0.2 Db ±5.0	
0°	10.39	264.0	5.71	145.0	4.35	110.6	13.33	33.66
2.5°	10.41	264.3	5.81	147.6	4.12	104.6	13.03	332.6
5°	10.39	264.0	5.91	150.0	3.87	98.4	12.85	326.4
7.5°	10.37	263.3	5.98	151.9	3.63	92.2	12.61	320.2
10°	10.36	263.1	6.05	153.6	3.36	85.9	12.36	313.9

Dimension:
Upper Side: inch
Bottom Side: mm

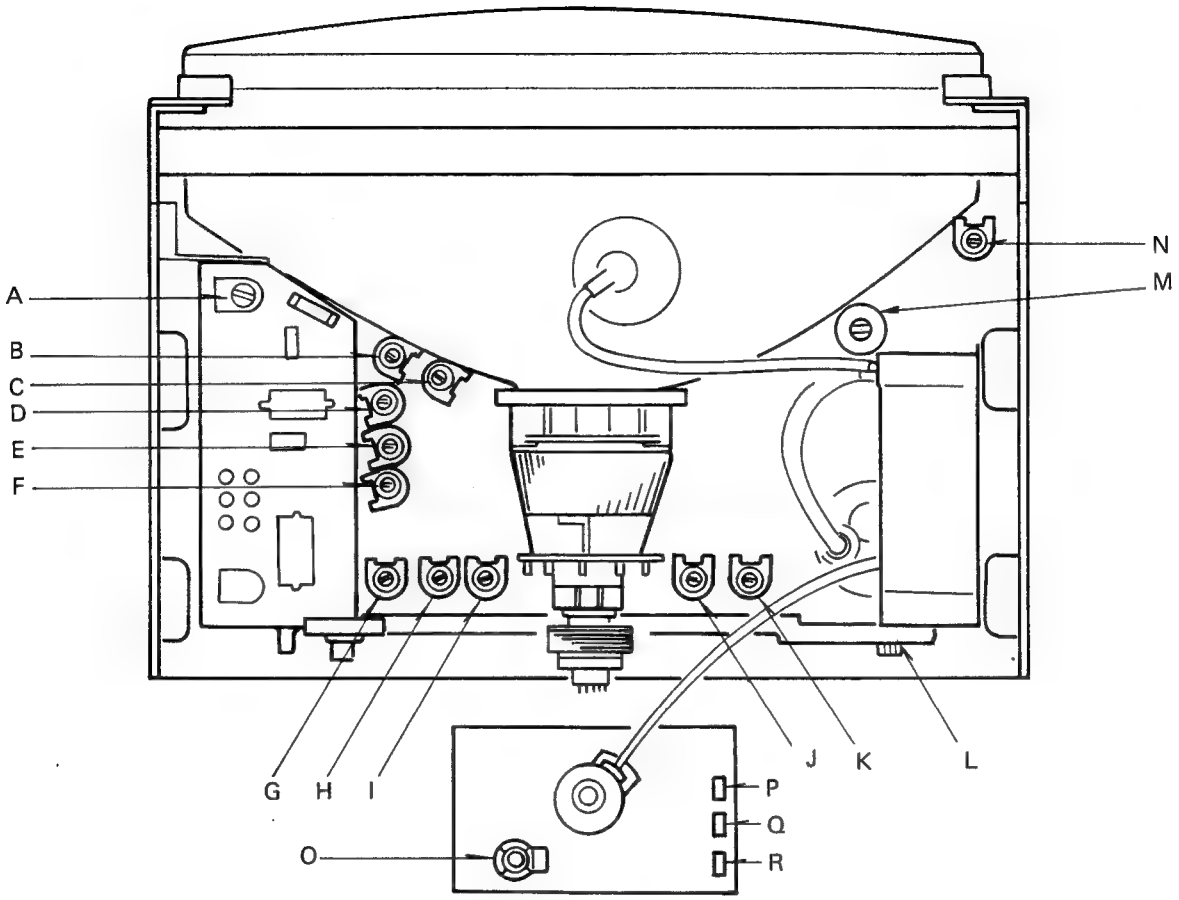


COMPONENT LOCATION



A .....CRT
B .....Degaus Coil Cnnector
C .....Intensity VR
D .....Power Supply
E .....Power input Connector
F .....Power Select Switch
G .....Signal Input Connector
H .....Interface Board
I .....CRT Socket Board
J .....Bottom Plate
K .....P.W.A Holder
L .....Mounting Metal
M.....Side Plate
(Right and Left)
N.....Deflection Yoke
O.....Degauss Coil
P .....H. OUT. TR (Q551)
Q.....CRT Tilt Chang Posi
R .....FBT

CONTROL DESCRIPTION



A.....B-ADJ (VR81)
B.....V.PCC (R754)
C .....V.Lin (R424)
D.....R.GAIN (R301)
E .....G.GAIN (R311)
F .....B.GAIN (R321)
G .....V.POSI (R420)
H .....V.SIZE (R426)
I ..... V.HOLD (R407)
J .....H.HOLD (R516)
K.....H.PHASE(R540)
L .... FOCUS
M.... H.WIDTH (L553)
N .....SUB BRIGHT (R554)
O .....SCREEN (R372)
P .....LOWLIGHT R (R338)
Q..... LOWLIGHT B (R358)
R .....LOWLIGHT G (R348)

CAUTION TO ADJUSTMENT AND REPAIR

1. Degaussing is inevifably required at purity adjustment or convergence adjustment.

2. At the factory, white balance meter is used but we descriped the data in simple way.

3. If you check or adjust electrical specification or function, more than 20 minutes burn-in is required.

4. Reforming of the leadwire is required after your repair work.

CAUTION FOR SERVICING

In case of servicing or replacing CRT, high Voltage sometimes remains in the anode of CRT, So, completely discharge high voltage before servicing or replacing CRT so as to prevert a shock to the serviceman.

In this case, dischage to the external conductive coating (aquadac) of CRT.

Factory set the switch at 220V side of monitor power supply.
When you need switchover, off is required before it.
As this model is the Frame type, any pressure on the CRT neck shall be avoided.

ADJUSTMENT PROCEDURE

1. Voltage adjustment

(1) +B (100V) Voltage adjustment

Adjust the VR81 (+B-ADJ) so as that the voltage at TP1 (test point of TNP82832) shall be 100V.

(2) Confirming the +B2, −B3, +B4.

2-1 +B2 (+58V)

Confirm the voltage at TP3 (test point of A-P, W, B) is +58 ±2V.

2-2 −B3 (−20V)

Confirm the voltage at TP4 (test point of A-P, W, B) is −20 ±2V.

2-3 +B4 (+20V)

Confirm the voltage at TP5 (test point of A-P, W, B) is +20V ±2V.

(3) Confirm the Heater voltage

Measure and confirm the voltage at the seveth pin of CRT socket is 6.0 ±0.2Vrms.

Measuring should be done later more than five minutes after power on.

2. CRT Screen adjustment (Adjustment of CRT cut off)

1) Adjust the R,G,B switch of signal generator so as that the CRT screen shows no signal.
2) Turn the sub-brightness VR (R554) to the MIN.
3) Turn the screen VR (R372) to the MIN.
4) Turn all the low light VRs clockwise from the solder view.
5) Insert the service switch of SC401 into "S" side.
6) Turn R554 (sub-brightness VR) so as that the voltage of G1 is −37V.
   Use the probe of 100:1 ratio.
7) Turn the screen VR and find what is the color which is light emitted at the last moment.
8) Turn the low light VRs of each color except that of your finding at item 7 toward darkness to the MAX.
9) Turn the screen VR and set it where the color you found at item 7 can be seen slightly.
10) Turn the low light VRs of other two colors and set them where these two colors can be seen at the same degree as you adjusted the color at item 9.
11) Insert the service switch of SC401 into "N" side.
12) Adjust R554 (Sub-brightness control volume on Main P.W.A) and set at the point where raster is off.
13) Viewing the oscilloscope, turn the R554 anti-clockwise until the voltage lowers 5V further (CRT 8 pin G1 voltage shows −22V.)

3. White Balance adjustment

1) Set the video gain volume (R.G.B) at the center.
2) Input the white signal of "H".
3) Adjust the video gain volumes (R:R308, G:R318 B:R328) so as that CRT shows white color.
4) After adjusting the white balance, rotate the brightness volume from MAX to MIN and make sure that the white balance is not changed.
   If something is wrong, please adjust the low light volume.

4. Purity adjustment

In case of ITC, this specification is applied only when the problem is found in the execution of "final confirmation method for purity"

1) Make sure that this adjustment should be done later more than 30 minutes after power on.
2) In the no magnetic field, erase the magnetism of chassis and CRT with degaussing coil.
3) Confirm that static convergence is roughly matched.
4) Display Red color solely with the signal generator.
5) Move the D.Y. to rear and adjust the purity magnet so as that the fireball is showed at the center of the screen.
6) After the adjustment of item 5, re-adjust the static convergence if some gap was found.
7) After the item 6, repeat the item 5 again.
8) Display the fireball of G and B. Adjust the purity magnets so as that each fire ball is at the center of the screen simultaneously.
9) Display the red color solely again and move the D.Y. in order to display the red color on the whole screen.
10) Confirm the "no magnetic field", "magnetic field" and "reverse magnetic field" to R.G.B respectively.
11) If there remains magnetism even after the adjustment, put the compensation magnet for purity to make countermeasure.

The final confirmation method for purity

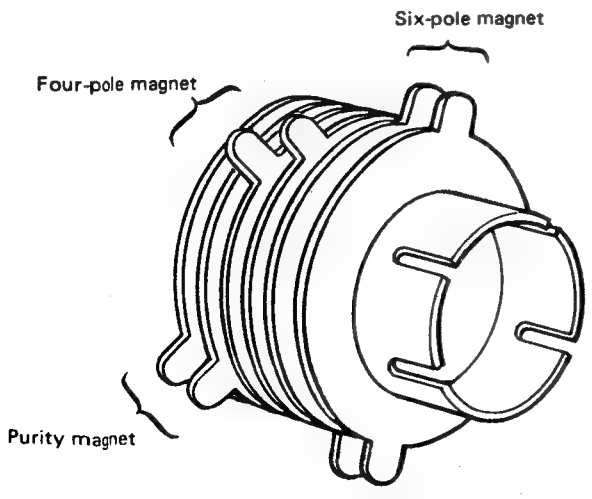
In the natural magnetic field, rotate the set in the direction of East, West, South and North. Field magnetic may causes magnetism on the set. Confirm that the automatic degaussing circuit built in the set can erase the amount of magnetism which was magnetized with above rotation.

5. Convergence adjustment

1) Input the mixed dot pattern of R and B with the signal generator.
2) Match the R and B at screen center with four pole magnet. (Rotate the two ring magnets and R. B move circularly with the other direction respectively.)
3) Input the mixed dot pattern of R.G.B with the signal generator.
4) At the screen center, match R and B to G with the six-pole magnet.
5) Make the fine tuning of D.Y. location so as to get good convergence on the whole-screen.
6) If the convergence on the fringe area is bad, put "the magnetic small pieces" at the four corners of D.Y. and fix them the convergence becomes better.

Note: Caution for putting "the magnetic small pieces".
(1) Take more than 20mm distance from anode cap.
(2) Don't put them duplicately.
(3) Don't put it on some other labels.

7) After the convergence adjustment, confirm if purity is OK.
In case purity is no good, back to [4] purity adjustment and re-adjust the purity.
8) Repeat the above procedure in several times and get the best purity and convergence.



Static Magnet

6. H. Hold Adjustment

Adjust R516 (H. Hold).so as that the character area locates at the raster center (Horizontally).

7. V. Hold Adjustment

Turn the R407 (V. Hold) toward lower vertical frequency so as that the picture becomes out of synchronous..
Turn the R407 (V.Hold) toward the opposite direction to the before until the picture becomes synchronized.

8. V. LIN Adjustment

1) Display cross-hatch with the character generator.
2) Adjust R426 (V. Size) for the vertical size to be 5.75 ±0.079" (146 ±2mm).
Adjust R420 (V. Posi) for cross-hatch to locate at CRT center.
3) Adjust R424 (V. Lin) for the V. LIN to be the best.

9. V. size Adjustment

Adjust R426 (V.size) for the vertical size to be 5.75 ±0.079" (146 ±2mm).

10. V. POSI Adjustment

Adjust R420 (V. posi) for the character area to locate at the CRT center.

11. H. Width Adjustment

Adjust L553 (H. Width) for H. WIDTH to become 8.27 ±0.079" (210 ±2mm).
Note: Inserting the L553's core into bobin is the direction of the adjustment.

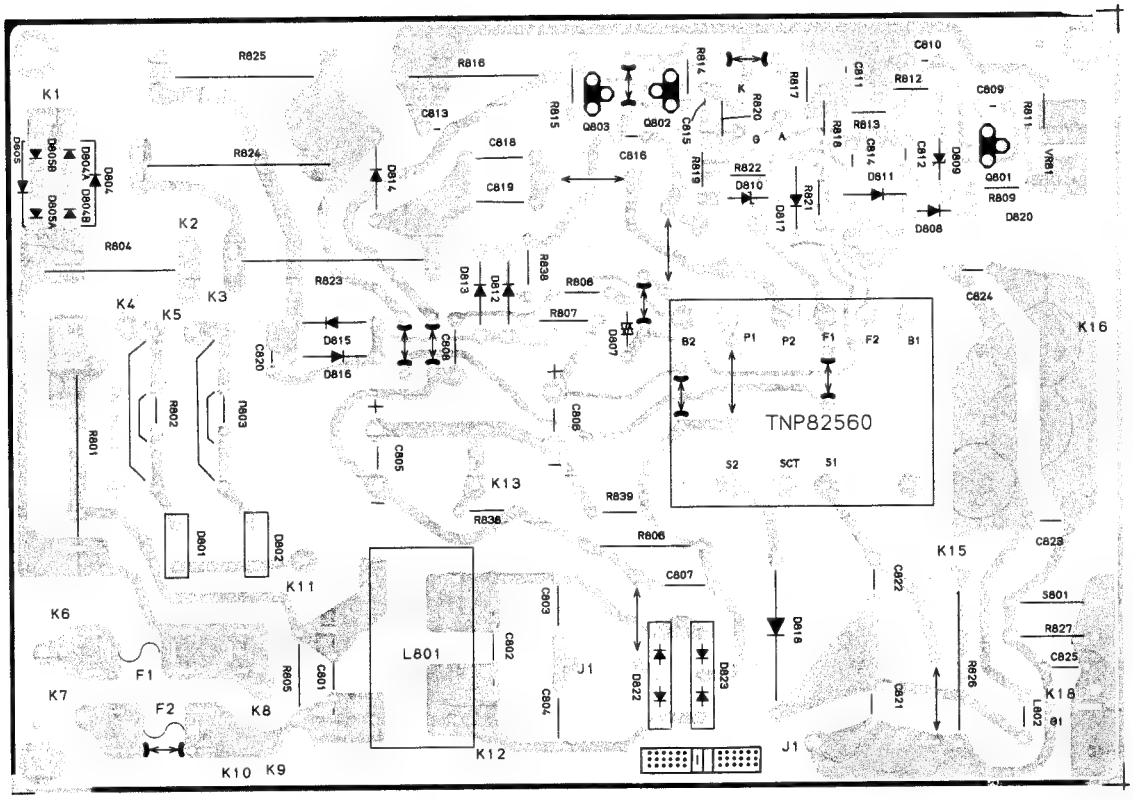
12. V. PCC (Vertical pin cushion) Adjustment

1) Display cross-hatch (Green color) with thesignal generator.
2) Adjust R754 (V. PCC) for vertical pin cushion to become minimum.

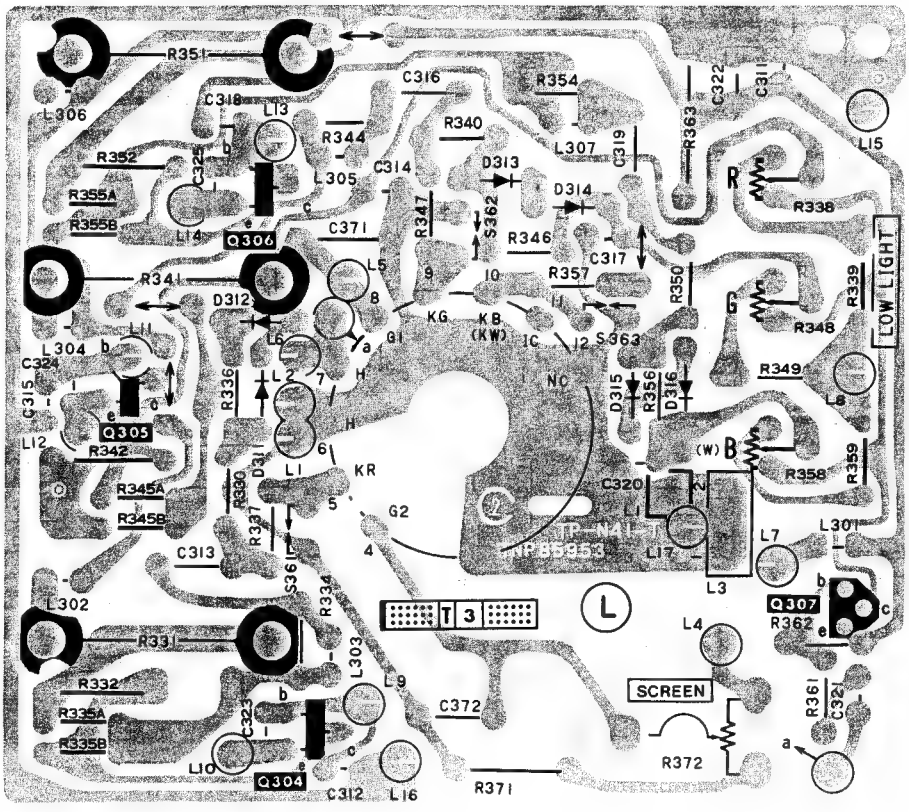
MEMO

POWER SUPPLY AND CRT-SOCKET CIRCUIT SOLDER VIEWS

MONITOR POWER SUPPLY CIRCUIT BOARD-SOLDER VIEW

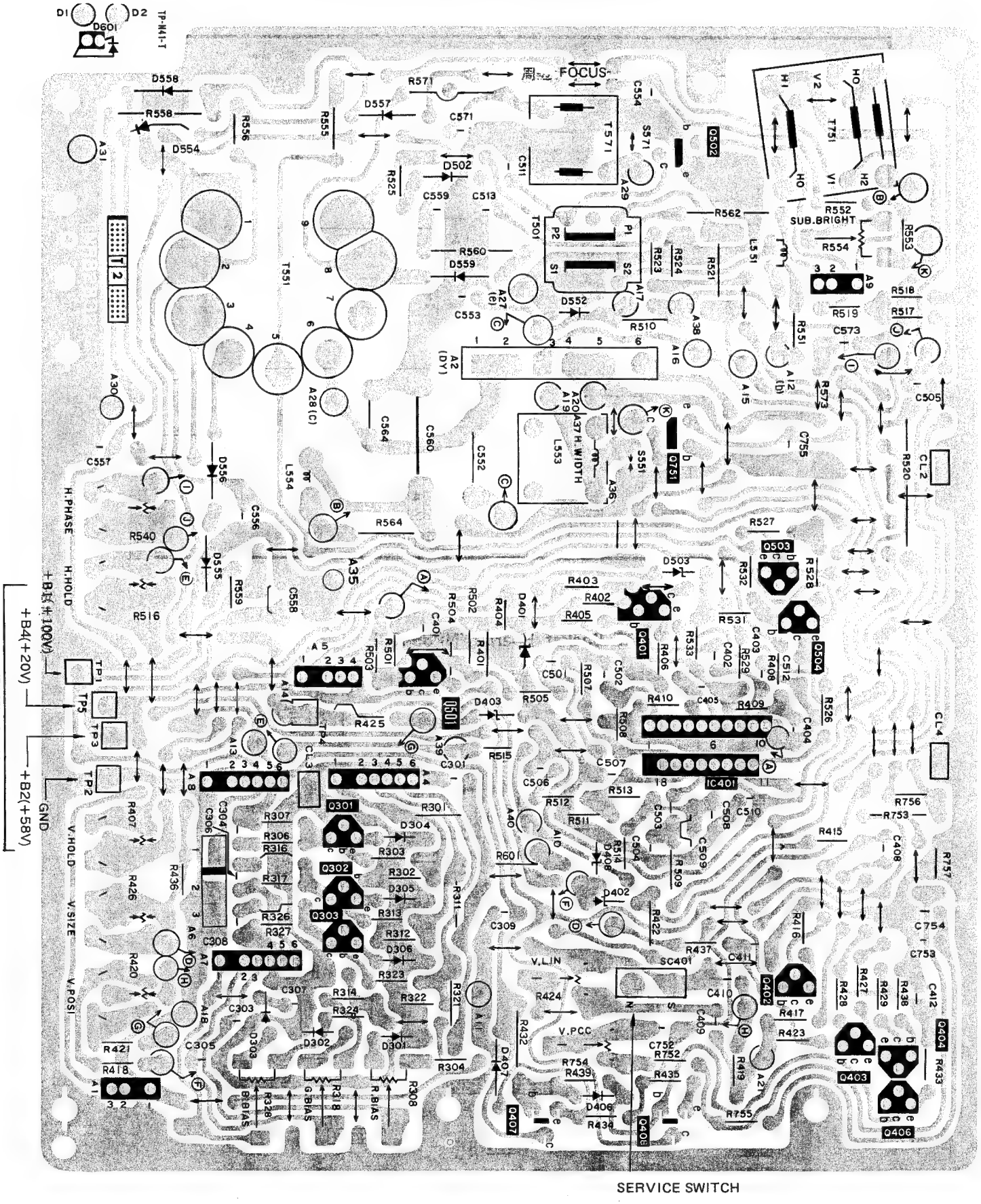


CRT Socket Board (TNP85953)

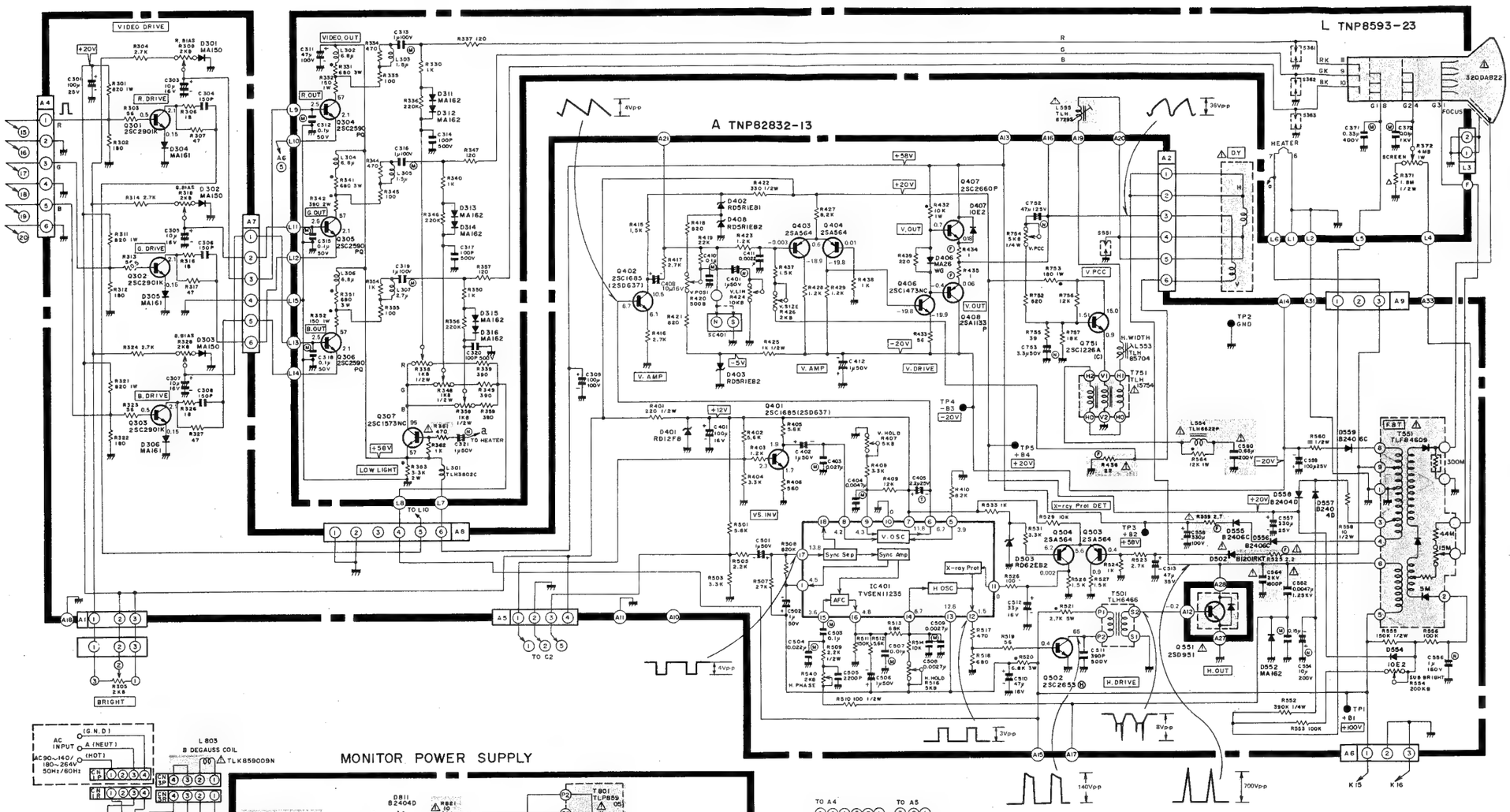


DRIVE CIRCUIT BOARD SOLDER VIEW

Analog Board (TNP82832)



SCHEMATIC DIAGRAM FOR TX-1201FH



SERVICE NOTE

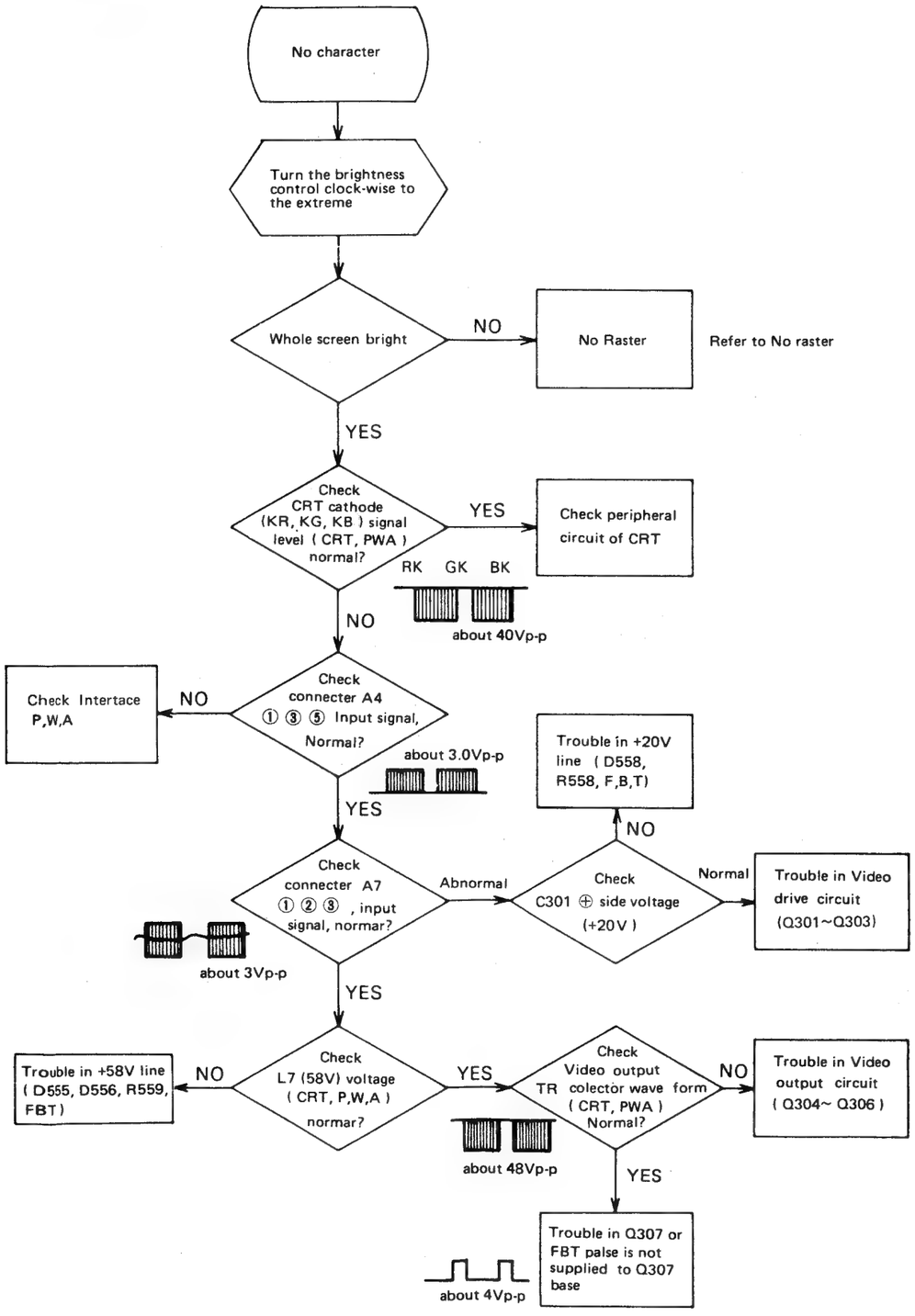
1. RESISTOR
   All resistors are carbon 1/4W resistor unless otherwise noted the following marks.
   Unit of resistance is OHM(Ω).(K=1,000. M=1,000,000)
   △: Solid resistor Ⓕ: Non Flame
2. CAPACITOR
   All capacitors are ceramic 50V capacitor unless otherwise noted the following marks.
   Unit of capacitance is μF unless otherwise noted.
   Ⓜ: Polyester Ⓢ: Polystylene capacitor
   ±: Electrolytic capacitor Ⓣ: Tantalum
3. COIL
   Unit of inductance is μH.
4. VOLTAGE MEASUREMENT
   a. Voltage is measured by a digital meter with DC 10MΩ OHM/V receiving normal signal.
   b. Use each measurement voltage for reference.

IMPORTANT SAFETY NOTICE

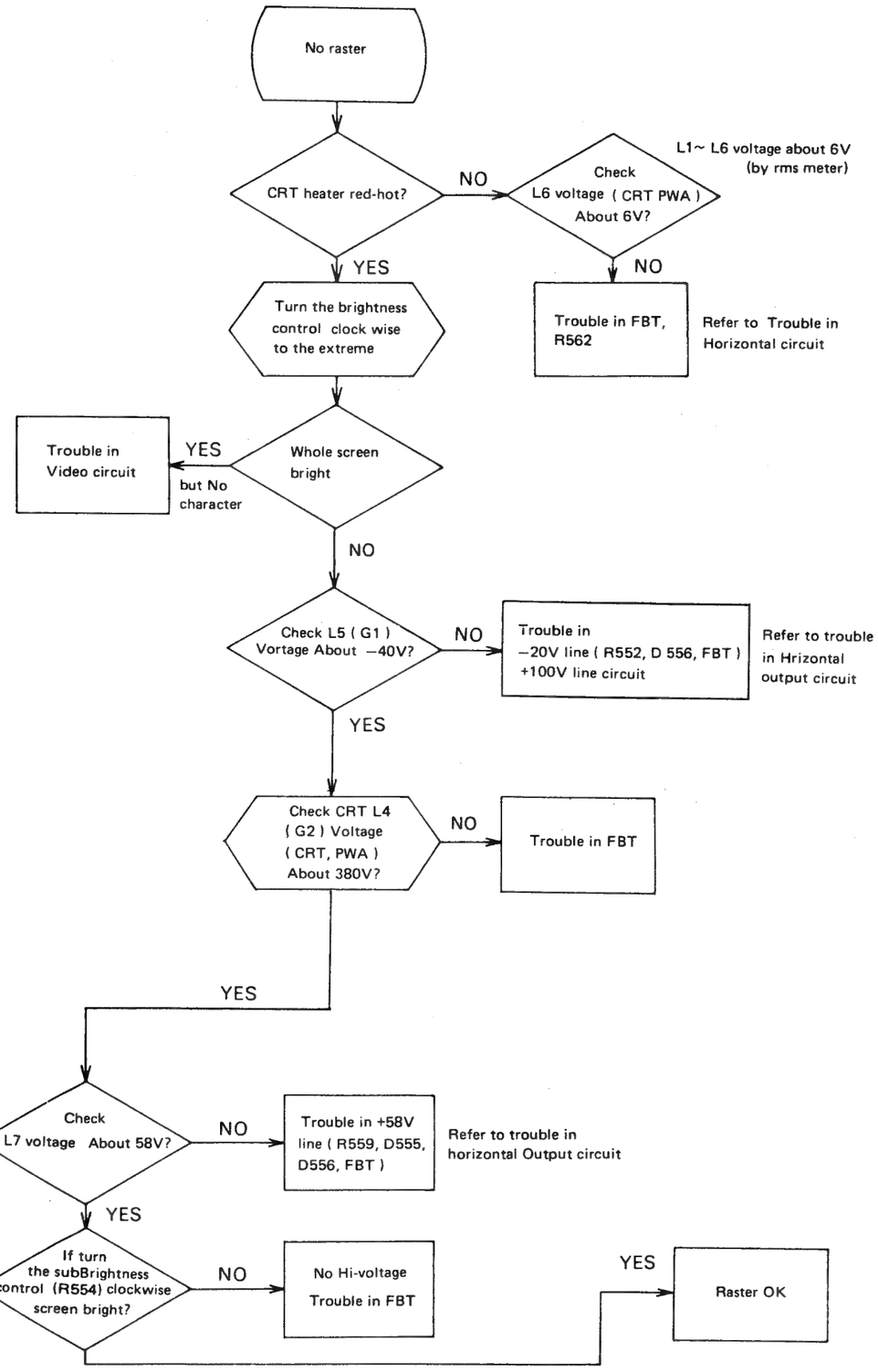
The component identified by shading or the international symbol △ on this schematic diagram incorporates special features important for protection from X-Radiation, fire and electrical shock hazards, When servicing it is essential that only manufacturer s specified parts be used for those critical components.

TROUBLE SHOOTING HINTS

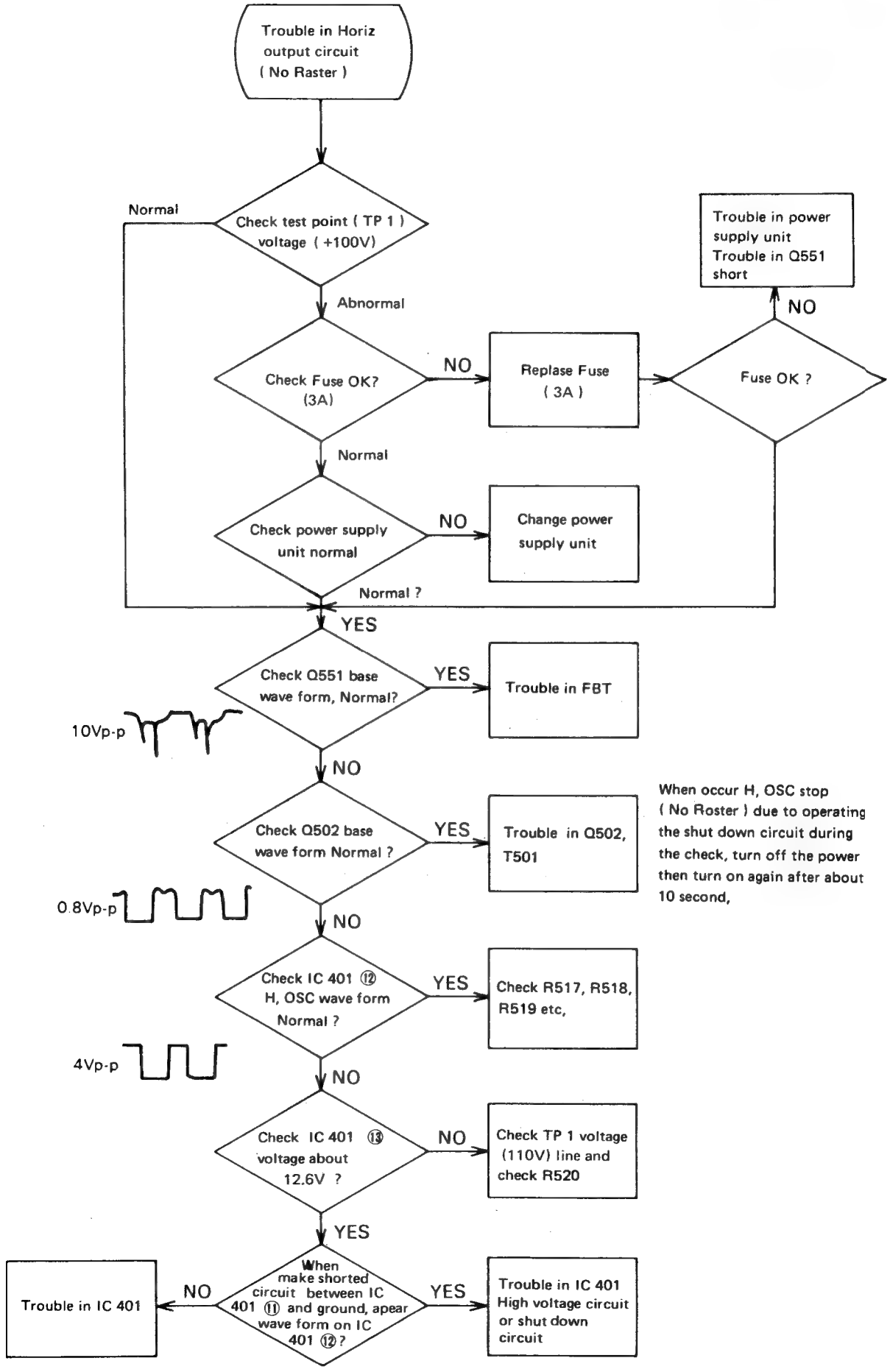
ⓐ NO character



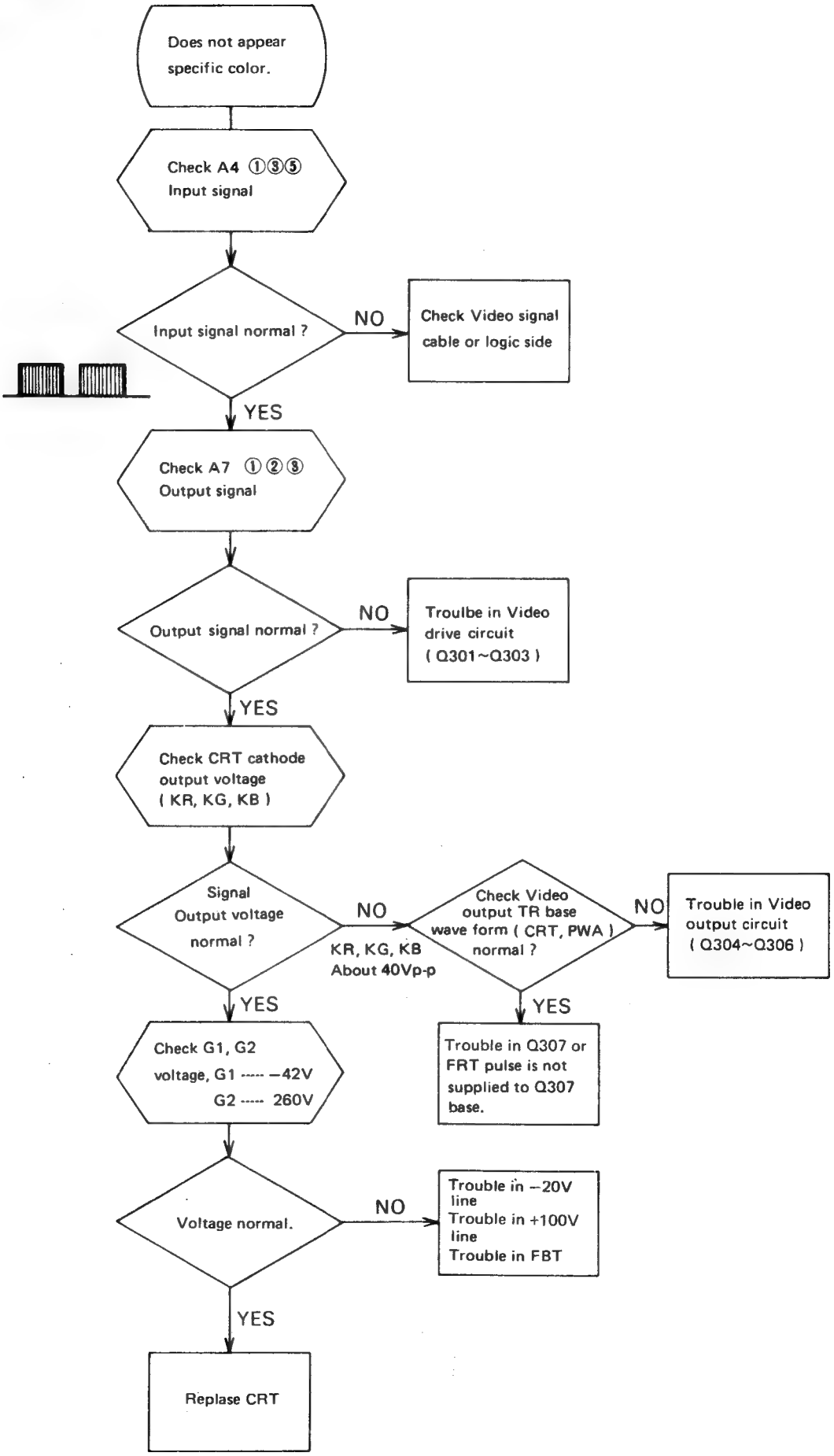
ⓑ No Raster



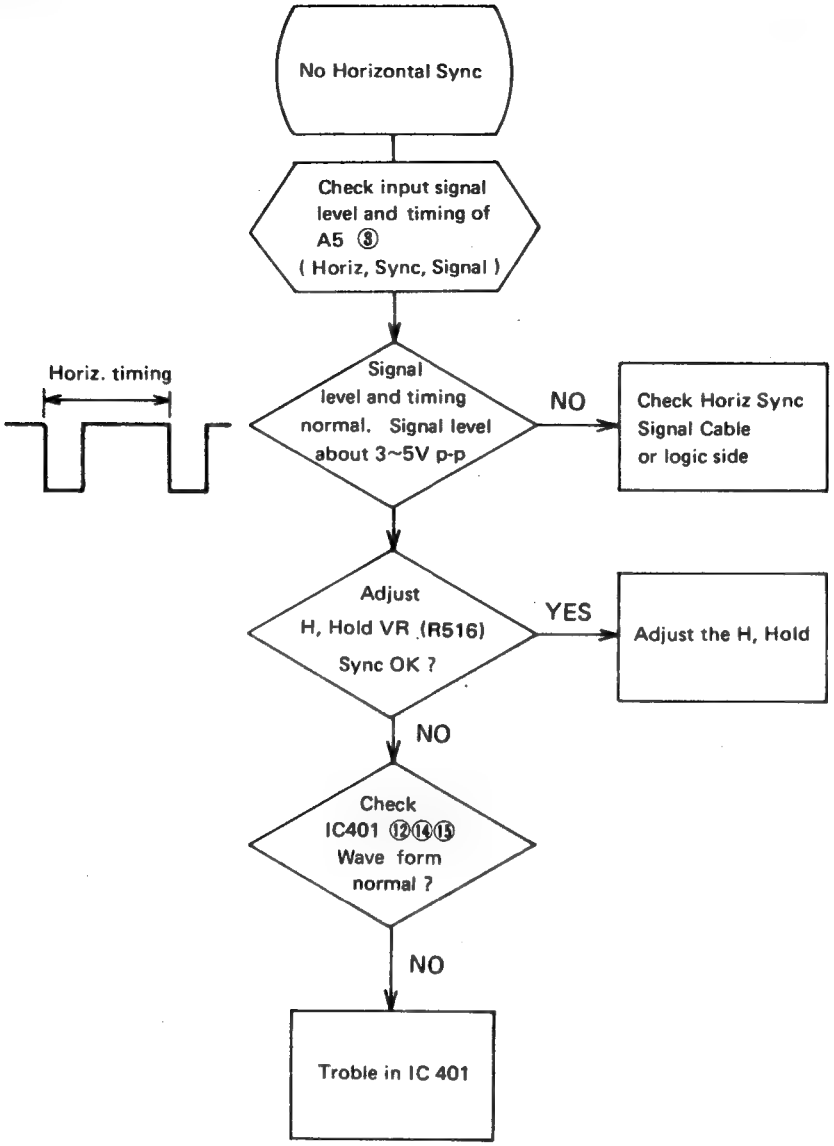
ⓑ–1 Trouble in Horiz Out Circuit



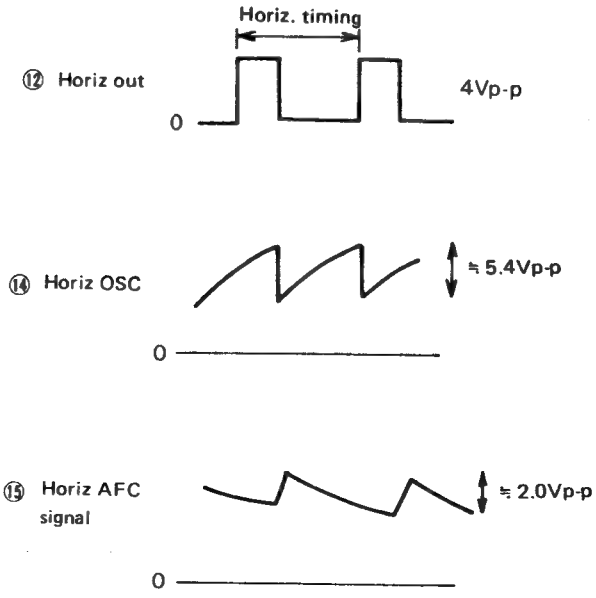
ⓒ Does not appear specific color



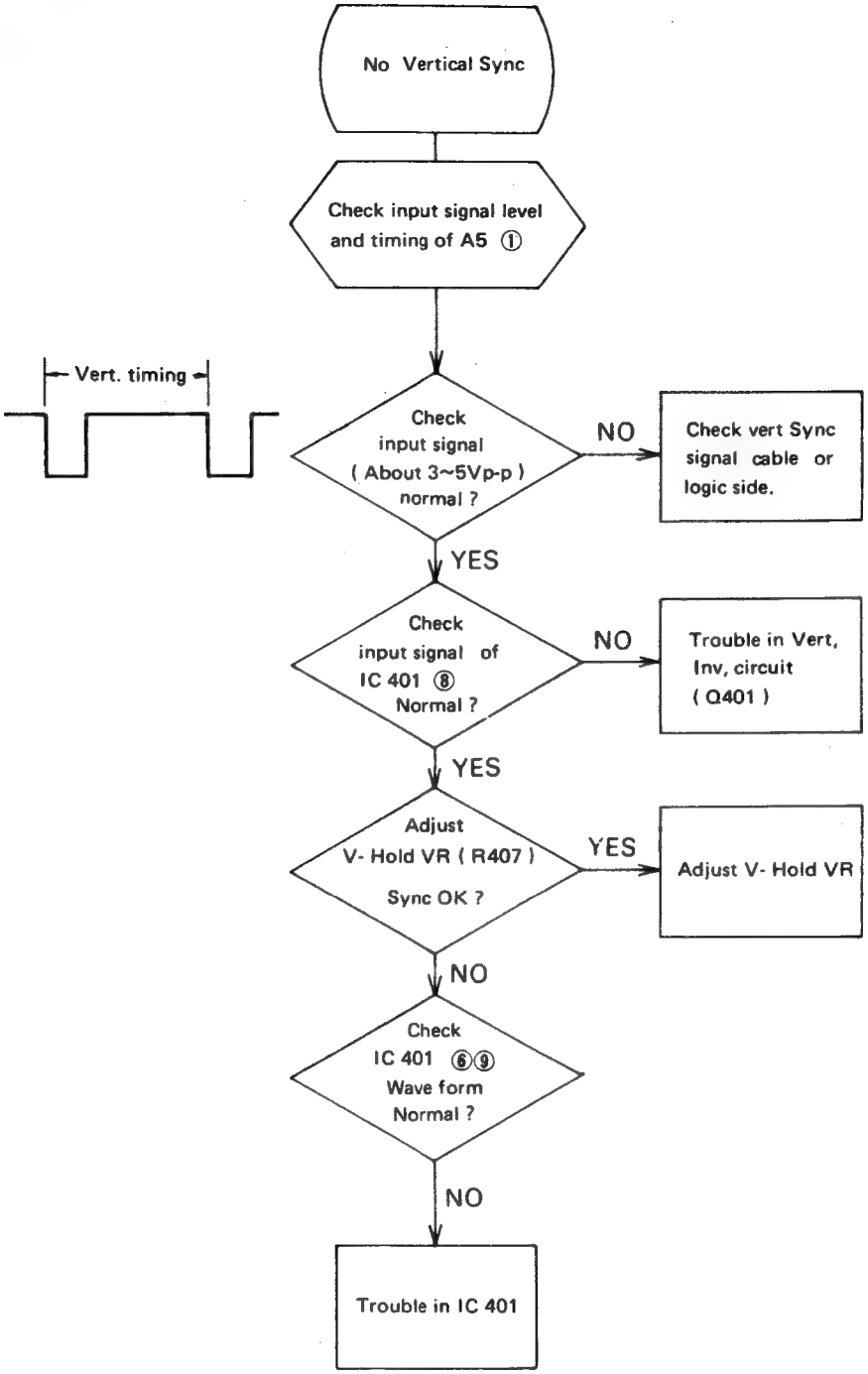
ⓓ NO Horizontal Sync.



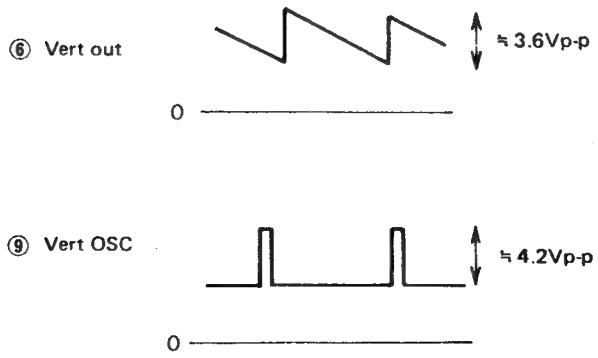
IC401



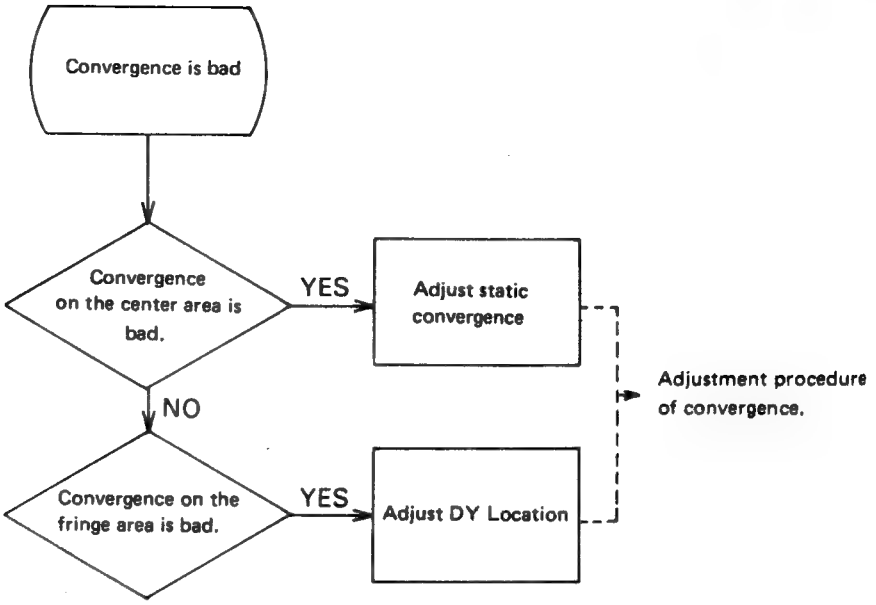
ⓔ NO Vertical Sync.



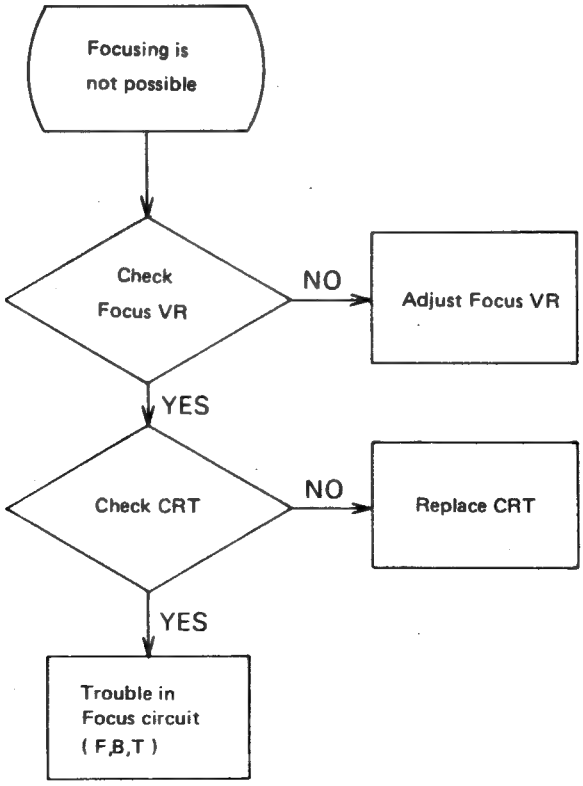
IC401



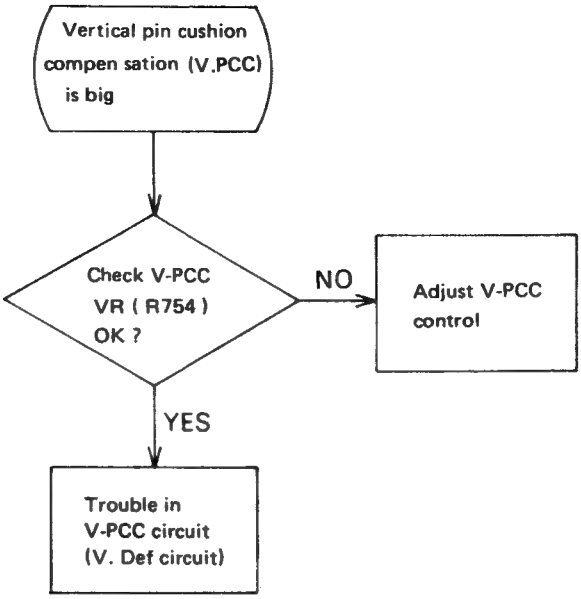
ⓕ Covergence is Bad



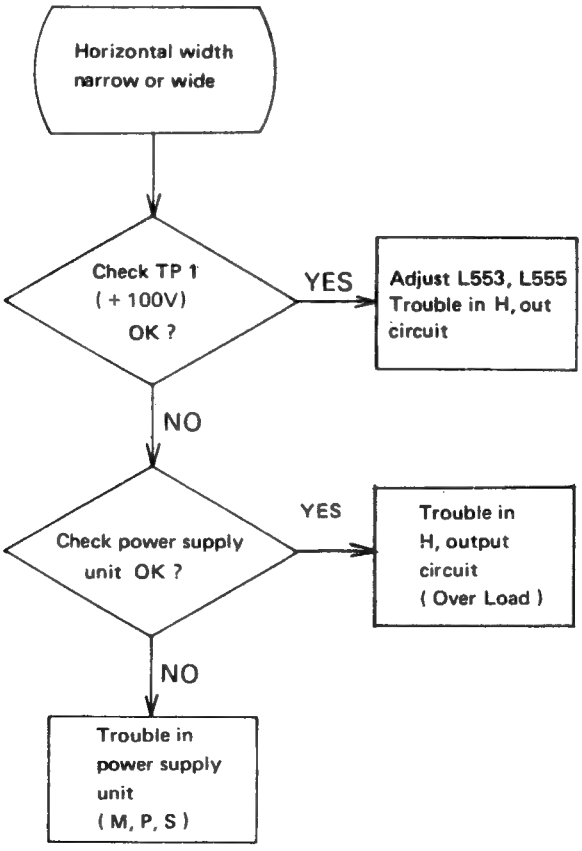
ⓖ Focusing Problem



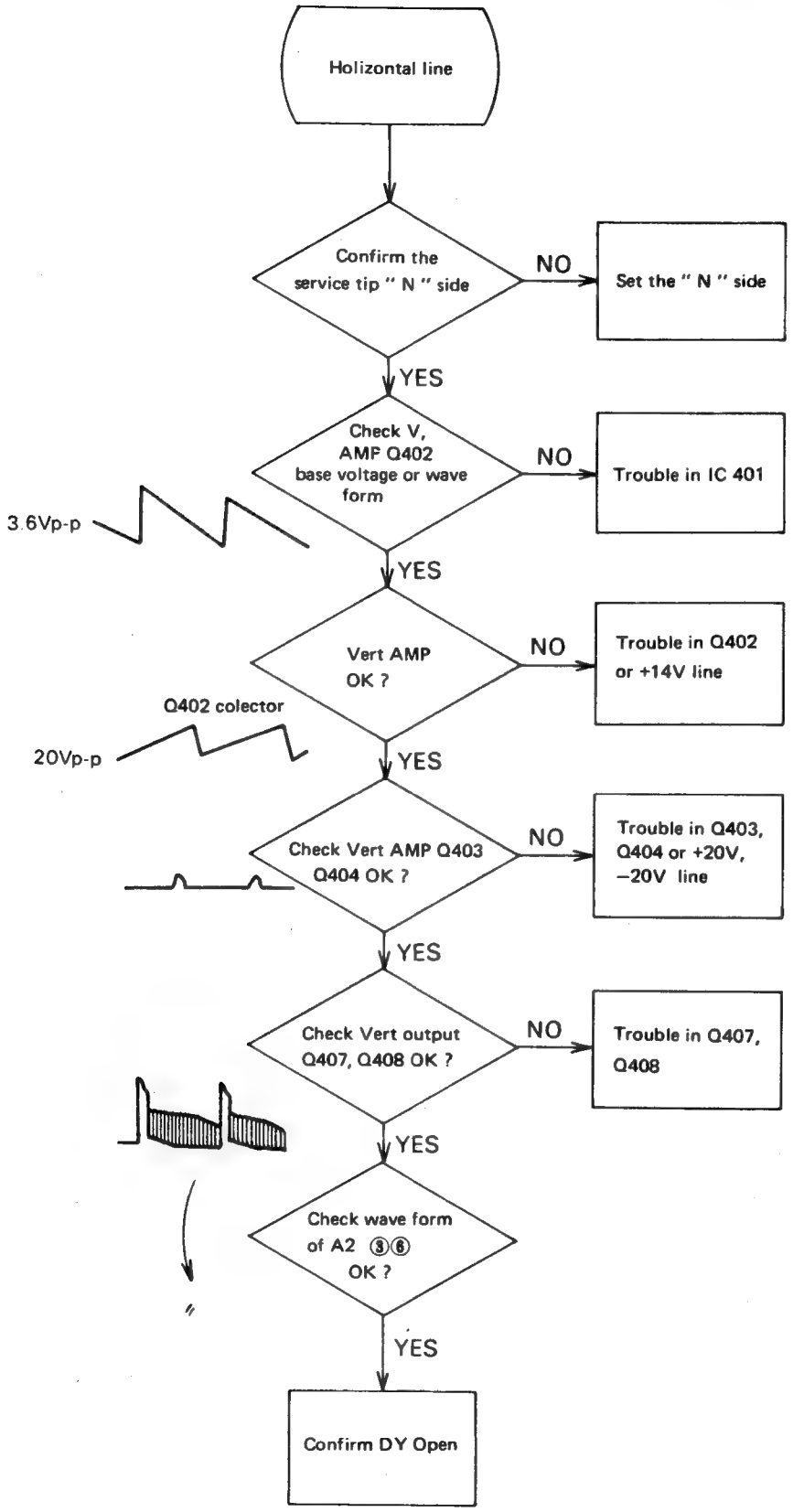
ⓗ Vertical Pin Compensation (V.PCC) is big



ⓘ Horizontal width is Abnormal



① Horizontal Line



REPLACEMENT PARTS LIST

Important Safety Notice

Cormponents identified by the International symbol ⚠ have special characteristics important for safety.
When replacing any of these components use only manufacturer's specified parts.

Note: Tolerance J: ±5% K: ±10% Z: $^{+80}_{-20}$% C: ±0.25pF

Ref. No.	Part No.	Description
CABINET AND MAIN CHASSIS PARTS		
	TUW85901	Side Plate Right
	TUW85902	Side Plate Left
	TUX85814-2	Side Bracket Right
	TUX85815-2	Side Bracket Left
	TUX85816	Bottom Plate
	TKX850501	P.C. Board Holder Bracket
	TKX850401	P.C. Board Holder
	TNP82832-13	Main P.C. Board Ass'y
	TNP85953-22	CRT P.C. Board Ass'y
	TNP82560-23	Power P.C. Board Ass'y
⚠	320DAB22TC01	(CRT) Picture Tube
⚠	TLK859008N	Degauss Coil
	TNP89912-21	Sub. P.C. Board Ass'y
	TUC85907	Power Case
	TUC85908	Power Cover
	TUX85108-1	Bracket
	TUX85205	Connector Bracket
	TUW85304	Switch Brackt
	TUX85112	Power Block Bracket
	TES201	Coil Spring
	TMM81460	Rubber
	TMM1459	Clip
	TMM15202	Crt Socket Cover
	TMM5402-1	Cord Band
	TMM81452	Insulator
	TMM85404	Barrier
	TMK84503	L. P.C. Board Barrier
	TMK13511	Tr. Barrier
	TMK3410	Mica Seat
	TMK84520	Power P.C. Board Barrier
	TBM80844-1	Model (Plate) TX1201FH
	TXAJTA6P156	6P Connector Ass'y (A2)
	TXAJTA3P478A	3P Connector Ass'y
	TXAJTA2P015	2P Connector Ass'y
	TXAJTA3P479	3P Connector Ass'y
Q551 ⚠	2SD951	Transistor
VR305	EVV58AF25B23	Control
	TPC851422	(Outer) Carton TX1201FH
	TXAPD11201ZE	Filler Complete
	TPE174005	Set Cover
	TQA811117	Schematic (Diagram) TX1201FH
	TQE616	Bag
	TQF80759	Warning Label
	XTB4+20BFN	Screw (CRT)
	XWG5H14	Washer (CRT)
	XWA5B	Washer (CRT)
	XTB4+8BFN	Screw (Power Block)
	XTV3+20BFN	Screw (P.C. Board Holder)
	XTV3+8BFN	Screw (Connector Bracket)

Ref. No.	Part No.	Description
SUB. P.C. BOARD TNP89912-21		
CN2	TJS828370	Socket
	TXAJTC4P255	4P Connector Ass'y
	TXAJTC6P175	6P Connector Ass'y
MAIN P.C. BOARD TNP82832-13		
I.C.		
IC401	TVSEN11235	I. C
TRANSISTORS		
Q301	2SC2901	Transistor (KL1)
Q302	2SC2901	Transistor (KL1)
Q303	2SC2901	Transistor (KL1)
Q401	2SC1685	Transistor
Q402	2SC1685	Transistor
Q403	2SA564A	Transistor
Q404	2SA564A	Transistor
Q406	2SC1473QNC	Transistor
Q407	2SC2660LBP	Transistor
Q408	2SA1133LBP	Transistor
Q502	2SC2653HLB	Transistor
Q503	2SA564A	Transistor
Q504	2SA564A	Transistor
Q751	2SC1226AC	Transistor
DIODES		
D301	MA150	Diode
D302	MA150	Diode
D303	MA150	Diode
D304	MA161	Diode
D305	MA161	Diode
D306	MA161	Diode
D401	TVSRD12FB	Diode
D402	TVSRD9R1EB1	Diode
D403	TVSRD5R1EB2	Diode
D406	MA26W0	Diode
D407	TVS10E2	Diode
D408	TVSRD5R1EB2	Diode
D502	TVSB1201RKT	Diode
D503	TVSRD6R2EB2	Diode
D552	MA162	Diode
D554	TVS10E2	Diode
D555	TVSB2406C	Diode
D556	TVSB2406C	Diode
D557	TVSB2404D	Diode
D558	TVSB2404D	Diode
D559	TVSB2406C	Diode

Ref. No.	Part No.	Description
	COILS & TRANS.	
L553	TLH85704	H. Width Coil
⚠ L554	TLH6622P	H. Lin. Coil (T.V)
T501	TLH6466	H. Drive Coil
⚠ T551	TLF84609	Flyback Trans
⚠ T751	TLH15754	V. PCC Coil
	CAPACITORS	
C301	ECEA1ES101	Electrolytic 100μF 25V
C303	ECEA1CS100	Electrolytic 10μF 16V
C304	ECKD1H151KB2	Ceramic 150pF K 50V
C305	ECEA1CS100	Electrolytic 10μF 16V
C306	ECKD1H151KB2	Ceramic 150pF K 50V
C307	ECEA1CS100	Electrolytic 10μF 16V
C308	ECKD1H151KB2	Ceramic 150pF K 50V
C309	ECEA2AS101	Electrolytic 100μF 100V
C401	ECEA1CS101	Electrolytic 100μF 16V
C402	ECEA1HS010	Electrolytic 1μF 50V
C403	ECQM1H273JZ	Polyester 0.027μF J 50V
C404	ECQM1H472JZ	Polyester 4700pF J 50V
C405	ECSF25E2R2N	Tantalum 2.2μF 25V
C408	ECEA1CS100	Electrolytic 10μF 16V
C409	ECEA1HN010S	Electrolytic 1μF 50V
C410	ECQM1H104JZ	Polyester 0.1μF J 50V
C411	ECQM1H222JZ	Polyester 2200pF J 50V
C501	ECEA1HS010	Electrolytic 1μF 50V
C502	ECEA1HS010	Electrolytic 1μF 50V
C503	ECQM1H104JZ	Polyester 0.1μF J 50V
C504	ECQM1H223JZ	Polyester 0.022μF J 50V
C505	ECKD1H222KB2	Ceramic 2200pF K 50V
C506	ECEA1HS010	Electrolytic 1μF 50V
C507	ECQM1H103JZ	Polyester 0.01μF J 50V
C508	ECQM1H272JZ	Polyester 2700pF J 50V
C509	ECQF6272KZ	Polypropylene 2700pF K 600V
C510	ECEA1CS470	Electrolytic 47μF 16V
C511	ECKD2H391KB9	Ceramic 390pF K 500V
C512	ECEA1CS330	Electrolytic 33μF 16V
C513	ECEA1VS470	Electrolytic 47μF 35V
⚠ C552	ECWH12H472JS	Polypropylene 4700pF J ½W
C553	ECQM1H154JZ	Polyester 0.15μF J 50V
C554	ECEA2DS100	Electrolytic 10μF 200V
C556	ECEA160N1	Electrolytic 1μF 160V
C557	ECEA1ES331	Electrolytic 330μF 25V
C558	ECEA2AS331	Electrolytic 330μF 160V
C559	ECEA1ES101	Electrolytic 100μF 25V
⚠ C560	ECWF2H684JZ	Polypropylene
⚠ C564	ECKD3D182KB8	Ceramic 1800pF K
C752	ECEA1EN470S	Electrolytic 47μF 25V
C753	ECEA1HN3R3S	Electrolytic 3.3μF 50V
	RESISTORS & CONTROL	
R301	ERD50FJ222	Carbon 2.2KΩ J ½W
R302	ERD25FJ331K	Carbon 330Ω J ¼W
R303	ERD25FJ560K	Carbon 56Ω J ¼W
R304	ERD25FJ272K	Carbon 2.7KΩ J ¼W
R306	ERD25FJ180K	Carbon 18Ω J ¼W

Ref. No.	Part No.	Description
R307	ERD25FJ470K	Carbon 47Ω J ¼W
R308	EVTS3MA00B23	Control 2KΩB
R311	ERD50FJ222	Metal 2.2KΩ J ½W
R312	ERD25FJ331K	Carbon 180Ω J ¼W
R313	ERD25FJ560K	Carbon 56Ω J ¼W
R314	ERD25FJ272K	Carbon 2.7KΩ J ¼W
R316	ERD25FJ180K	Carbon 18Ω J ¼W
R317	ERD25FJ470K	Carbon 47Ω J ¼W
R318	EVTS3MA00B23	Control 2KΩB
R321	ERD50FJ222	Metal 2.2KΩ J ½W
R322	ERD25FJ331K	Carbon 330Ω J ¼W
R323	ERD25FJ560K	Carbon 56Ω J ¼W
R324	ERD25FJ272K	Carbon 2.7KΩ J ¼W
R326	ERD25FJ180K	Carbon 18Ω J ¼W
R327	ERD25FJ470K	Carbon 47Ω J ¼W
R328	EVTS3MA00B23	Control 2KΩB
R401	ERD50FJ221K	Carbon 220Ω J ¼W
R402	ERD25FJ562K	Carbon 5.6KΩ J ¼W
R403	ERD25FJ122K	Carbon 1.2KΩ J ¼W
R404	ERD25FJ332K	Carbon 3.3KΩ J ¼W
R405	ERD25FJ562K	Carbon 5.6KΩ J ¼W
R406	ERD25FJ561K	Carbon 560Ω J ¼W
R407	EVTV0UA00B53	Control 5KΩB
R408	ERD25FJ332K	Carbon 3.3KΩ J ¼W
R409	ERD25FJ123K	Carbon 12KΩ J ¼W
R410	ERD25FJ822K	Carbon 8.2KΩ J ¼W
R415	ERD25FJ152K	Carbon 1.5KΩ J ¼W
R416	ERD25FJ272K	Carbon 2.7KΩ J ¼W
R417	ERD25FJ272K	Carbon 2.7KΩ J ¼W
R418	ERD25FJ821K	Carbon 820Ω J ¼W
R419	ERD25FJ223K	Carbon 22KΩ J ¼W
R420	EVTV0UA00B52	Control 500ΩB
R421	ERD25FJ821K	Carbon 820Ω J ¼W
R422	ERD50FJ331K	Carbon 330Ω J ½W
R423	ERD25FJ122K	Carbon 1.2KΩ J ¼W
R424	EVTS3MA00B14	Control 10KΩB
R425	ERD50FJ102	Carbon 1KΩ J ½W
R426	EVTV0UA00B23	Control 2KΩB
R427	ERD25FJ822K	Carbon 8.2KΩ J ¼W
R428	ERD25FJ122K	Carbon 1.2KΩ J ¼W
R429	ERD25FJ122K	Carbon 1.2KΩ J ¼W
R432	ERG1ANJ103	Metal 10KΩ J 1W
R433	ERD25FJ560K	Carbon 56Ω J ¼W
R434	ERD25FJ1R0K	Carbon 1Ω J ¼W
R435	ERD25FJ1R0K	Carbon 1Ω J ¼W
⚠ R436	ERD25FJ2R2K	Carbon 2.2Ω J ¼W
R437	ERD25FJ152K	Carbon 1.5KΩ J ¼W
R438	ERD25FJ102K	Carbon 1KΩ J ¼W
R439	ERD25FJ221K	Carbon 220Ω J ¼W
R501	ERD25FJ562K	Carbon 5.6KΩ J ¼W
R503	ERD25FJ332K	Carbon 3.3KΩ J ¼W
R505	ERD25FJ222K	Carbon 2.2KΩ J ¼W
R507	ERD25FJ273K	Carbon 27KΩ J ¼W
R508	ERD25FJ824K	Carbon 820KΩ J ¼W
R509	ERD50FJ222K	Carbon 2.2KΩ J ½W

Ref. No.	Part No.	Description			
R510	ERD50FJ101K	Carbon	100Ω	J	½W
R511	ERD25FJ154K	Carbon	150KΩ	J	¼W
R512	ERD25FJ562K	Carbon	5.6KΩ	J	¼W
R513	ERD25FJ683K	Carbon	68KΩ	J	¼W
R514	ERD25FJ103K	Carbon	10KΩ	J	¼W
R516	EVTV0UA00B53	Control	5KΩB		
R517	ERD25FJ471K	Carbon	470Ω	J	¼W
R518	ERD25FJ681K	Carbon	680Ω	J	¼W
R519	ERD25FJ560K	Carbon	56Ω	J	¼W
R520	ERG3ANJ682	Metal	6.8KΩ	J	3W
R521	ERG5ZJ272	Metal	2.7KΩ	J	5W
R523	ERD25FJ272K	Carbon	2.7KΩ	J	¼W
R524	ERD25FJ102K	Carbon	1KΩ	J	¼W
R525 ⚠	ERD25FJ2R2K	Carbon	2.2Ω	J	¼W
R526	ERD25FJ101K	Carbon	100Ω	J	¼W
R527	ERD25FJ152K	Carbon	1.5KΩ	J	¼W
R528	ERD25FJ152K	Carbon	1.5KΩ	J	¼W
R529	ERD25FJ103K	Carbon	10KΩ	J	¼W
R531	ERD25FJ332K	Carbon	3.3KΩ	J	¼W
R533	ERD25FJ102K	Carbon	1KΩ	J	¼W
R540	EVTV0UA00B23	Control	2KΩB		
R552	ERD25FJ394K	Carbon	390KΩ	J	¼W
R553	ERD25FJ104K	Carbon	100KΩ	J	¼W
R554	EVTS3MA00B25	Control	2MΩB		
R555	ERD50FJ154	Carbon	150KΩ	J	½W
R556	ERD25FJ104K	Carbon	100KΩ	J	¼W
R558	ERQ12JH1R0	Fuseble	1Ω	J	½W
R559 ⚠	ERD25FJ2R7K	Carbon	2.7Ω	J	¼W
R560	ERQ12HJ1R0	Fuseble	1Ω	J	½W
R564	ERG1ANJ122	Metal	1.2KΩ	J	1W
R752	ERD25FJ821K	Carbon	820Ω	J	¼W
R753	ERG1ANJ181	Metal	180Ω	J	1W
R754	EVTS3MA00B53	Control	5KΩB		
R755	ERD25FJ390K	Carbon	39Ω	J	¼W
R756	ERD25FJ123K	Carbon	12KΩ	J	¼W
R757	ERD25FJ182K	Carbon	1.8KΩ	J	¼W

OTHER PARTS

S551	TGPS152GL	Spark Gap
A1	TJS868250	3P Housing Socket
A4	TJS868280	6P Housing Socket
A5	TJS868260	4P Housing Socket
A7	TJS868280	6P Housing Socket
A8	TJS868280	6P Housing Socket
A9	TJS868250	3P Housing Socket
	TMK81423	Mica Seet
	TES6162	Tr. Spring
	TUX85810-1	Flyback Bracket
	TXAJTA1P076A	1P Connector Ass'y

CRT P.C. BOARD TNP85953-22

TRANSISTORS

Q304	2SC2590	Transistor (P.Q)
Q305	2SC2590	Transistor (P.Q)
Q306	2SC2590	Transistor (P.Q)
Q307	2SC1573ANC	Transistor

Ref. No.	Part No.	Description
	DIODES	
D311	MA162	Diode
D312	MA162	Diode
D313	MA162	Diode
D314	MA162	Diode
D315	MA162	Diode
D316	MA162	Diode
	COILS	
L301	TLH3802C	Coil
L302	TLT068-999	Peaking Coil
L303	TLT015-999	Peaking Coil
L304	TLT068-999	Peaking Coil
L305	TLT015-999	Peaking Coil
L306	TLT082-999	Peaking Coil
L307	TLT027-999	Peaking Coil

CAPACITORS

C311	ECEA2AS470	Electrolytic	47μF		100V
C312	ECQM1H104JZ	Polyester	0.1μF	J	50V
C313	ECQE1105KZ	Polyester	1μF	K	100V
C314	ECKD2H101KB2	Ceramic	100pF	K	500V
C315	ECQM1H104JZ	Polyester	0.1μF	J	50V
C316	ECQE1105KZ	Polyester	1μF	K	100V
C317	ECKD2h101KB2	Ceramic	100pF	K	500V
C318	ECQM1H104JZ	Polyester	0.1μF	J	50V
C319	ECQE1105KZ	Polyester	1μF	K	100V
C320	ECKD2H101KB2	Ceramic	100pF	K	500V
C321	ECEA1HN010S	Electrolytic	1μF		50V
C371	ECQE4334KZ	Polyester	0.33μF	K	400V
C372	ECQE10103KZ	Polyester	0.01μF	K	1KV

RESISTORS & CONTROL

R330	ERD25FJ102K	Carbon	1KΩ	J	¼W
R331	ERG3ANJ681	Metal	680Ω	J	3W
R332	ERG1ANJ151	Metal	150Ω	J	1W
R334	ERD25FJ471K	Carbon	470Ω	J	¼W
R335A	ERD25FJ101K	Carbon	100Ω	J	¼W
R336	ERD25FJ224K	Carbon	220KΩ	J	¼W
R337	ERD25FJ121K	Carbon	120Ω	J	¼W
R338	EVMH0GA00B13	R. Low Light	1KΩB		
R339	ERD25FJ391K	Carbon	390Ω	J	¼W
R340	ERD25FJ102K	Carbon	1KΩ	J	¼W
R341	ERG3ANJ681	Metal	680Ω	J	3W
R342	ERG1ANJ151	Metal	150Ω	J	1W
R344	ERD25FJ471K	Carbon	470Ω	J	¼W
R345A	ERD25FJ101K	Carbon	100Ω	J	¼W
R346	ERD25FJ224K	Carbon	220KΩ	J	¼W
R347	ERD25FJ121K	Carbon	120Ω	J	¼W
R348	EVMH0GA00B13	G. Low Light	1KΩB		
R349	ERD25FJ391K	Carbon	390Ω	J	¼W
R350	ERD25FJ102K	Carbon	1KΩ	J	¼W
R351	ERG3ANJ681	Metal	680Ω	J	3W
R352	ERG1ANJ151	Metal	150Ω	J	1W
R354	ERD25FJ102K	Carbon	1KΩ	J	¼W
R355A	ERD25FJ101K	Carbon	100Ω	J	¼W

Ref. No.	Part No.	Description			
R356	ERD25FJ224K	Carbon	220KΩ	J	¼W
R357	ERD25FJ121K	Carbon	120Ω	J	¼W
R358	EVMH0GA00B13	B. Low Light	1KΩB		
R359	ERD25FJ391K	Carbon	390Ω	J	¼W
R361 ⚠	ERD25FJ471K	Carbon	470Ω	J	¼W
R362	ERD25FJ102K	Carbon	1KΩ	J	¼W
R363	ERG2ANJ332	Metal	3.3KΩ	J	2W
R371	ERC12GJ185	Solid	1MΩ	J	½W
R372	EVME6U10KB46	Control	4MΩB		
S361	TGPS152GL	Spark Gap			

OTHER PARTS

S362	TGPS152GL	Spark Gap
S363	TGPS152GL	Spark Gap
	TJS35030	CRT Socket
	TXAJTC3P453	3P Connector Ass'y (A9)
	TXAJTC6P158A	6P Connector Ass'y (A8)
	TXAJTC6P157E	6P Connector Ass'y (A7)
	TSC8906-0	Ferrite Core

TRANSISTORS

Q801	2SA720	Transistor (R.S)
Q802	2SA886BF	Diode (Q.R)
Q803	2SC1847BF	Diode (Q.R)
Q804	M23CED	Transistor
Q805	2SC2834A	Transistor

DIODES

D801 ⚠	ERPF6B0M100F	Ceramic			
D802 ⚠	ERPF5B0M120G	Ceramic			
D803 ⚠	ERPF5B0M120G	Ceramic			
D804A ⚠	TVS10E2	Diode			
D804B ⚠	TVS10E2	Diode			
D805A ⚠	TVS10E2	Diode			
D805B ⚠	TVS10E2	Diode			
D807	TVSN413M	Diode			
D808	ERD25FJ121K	Carbon	120Ω	J	¼W
D809 ⚠	TVSRD5R1EB2	Diode			
D810	TVSRD20EB3	Diode			
D811	TVSB2404D	Diode			
D312	TVSB2404D	Diode			
D813	TVSB2404D	Diode			
D814	TVSB2404D	Diode			
D815	TVSB2404D	Diode			
D816	TVSUF-3VT	Diode			
D817	TVSB2404D	Diode			
D818	TVSUF-3VT	Diode			
D822 ⚠	TVSMI-15R	Diode			
D823 ⚠	TVSMI-15S	Diode			

COILS & TRANS.

L801	TLP85604E	Coil Trans.
L802	TLT341-119C	Peaking Coil
T801 ⚠	TLP85905-1	Trans.

CAPACITORS

C801 ⚠	ECQU1A473ME	Ceramic	0.047μF
C802 ⚠	ECQU1A473ME	Ceramic	0.047μF
C803 ⚠	ECKDEL222ZE	Ceramic	2200pF

Ref. No.	Part No.	Description			
C804 ⚠	ECKDEL222ZE	Ceramic	2200pF		
C805	ECES2DV331S	Electrolytic	330μF		200V
C806	ECES2DV331S	Electrolytic	330μF		200V
C807	ECQE4104KZ	Polyester	0.1μF	K	400V
C808	ECQE4104KZ	Polyester	0.1μF	K	400V
C809	ECQM1H333JZ	Polyester	0.033μF	J	50V
C810	ECQM1H104JZ	Polyester	0.033μF	J	50V
C811	ECQM1H473JZ	Polyester	0.033μF	J	50V
C812	ECEA25Z22	Electrolytic	22μF		25V
C813	ECQV05105JZ	Electrolytic		J	
C814	ECEA1AS101	Electrolytic	100μF		10V
C815	ECQM1H103JZ	Polyester	0.01μF	J	50V
C816	ECEA1HS101	Electrolytic	100μF		50V
C818	ECKD3A222KB8	Ceramic	2200pF	K	
C819	ECQM1H154JZ	Polyester	0.15μF	J	50V
C821	ECEA2DS101	Electrolytic	100μF		200V
C823	ECEA2DS101	Electrolytic	100μF		200V
C825	ECQE6103KZ	Polyester	0.01μF	K	600V

RESISTOR & CONTROL

R801	ERF15ZXK5R6	Non Flame	5.6Ω	K	15W
R804 ⚠	ERF5AJ680	Non Flame	68Ω	J	5W
R805 ⚠	ERC12ZGK335	Solid	3.3MΩ	K	½W
R806	ERC1GK154	Solid	150KΩ	K	1W
R807	ERD50FJ474	Carbon	470KΩ	J	½W
R808	ERD25FJ102K	Carbon	1KΩ	J	¼W
R809 ⚠	ERD25FJ182K	Carbon	1.8KΩ	J	¼W
R811 ⚠	ERD25FJ272K	Carbon	2.7KΩ	J	¼W
R812	ERD25FJ681K	Carbon	680Ω	J	¼W
R813 ⚠	ERD25FJ2R7K	Carbon	2.7Ω	J	¼W
R814	ERD25FJ101K	Carbon	100Ω	J	¼W
R815	ERD25FJ101K	Carbon	100Ω	J	¼W
R816	ERF3AKR82	Non Flame	0.82Ω	K	3W
R817	ERD25FJ102K	Carbon	1KΩ	J	¼W
R818	ERD25FJ561K	Carbon	560Ω	J	¼W
R820	ERD25FJ222K	Carbon	2.2KΩ	J	¼W
R821 ⚠	ERD25FJ100K	Carbon	10Ω	J	¼W
R822	ERD25FJ331K	Carbon	330Ω	J	¼W
R823	ERF10ZJ680	Non Flame	68Ω	J	10W
R824	ERF10ZJ680	Non Flame	68Ω	J	10W
R825	ERF5AJ330	Non Flame	33Ω	J	5W
R826	ERG3ANJ153	Metal	15KΩ	J	5W
R827	ERC12GJ153	Solid	15KΩ	J	½W
R828	ERD25FJ564K	Carbon	560KΩ	J	¼W
R839	ERD25FJ564K	Carbon	560KΩ	J	¼W
VR81 ⚠	EVTV0UA00B13	Control	1KΩB		

OTHER PARTS

S801	TNQ8947	Spleter
FS1,3	TJC305-1	Fuse Holder
G1	TJC6137	GND Spring
	TES6162	TR Spring
	TMK81423	Mica Seat
	XBA2F30NU100	Fuse 3A
	ESD391	Selecter Switch
	TXAJTA4P246A	4P Connector Ass'y
	TXAJTV3P527	3P Connector Ass'y
	TXAJTX4P247	4P Connector Ass'y

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